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***FINAL***

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**STANDARDS OF PRACTICE –  
PRACTICE-SPECIFIC STANDARDS  
FOR ACTUARIAL EVIDENCE**

**COMMITTEE ON CONSOLIDATED STANDARDS OF PRACTICE**

**NOVEMBER 2003**

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**4000—ACTUARIAL EVIDENCE**

## 4100 GENERAL CONSIDERATIONS

### 4110 SCOPE

- .01 The actuarial evidence practice covers a broad range of technical advice to the courts, other tribunals and to the parties involved in legal actions. Such advice may include testimony as an expert witness.
- .02 Work as an expert witness often entails calculation of capitalized values, but will sometimes cover other matters.

### 4120 CAPITALIZED VALUES

- .01 Actuarial evidence practice frequently deals with the determination of the capitalized value of amounts for purposes of litigation or an agreement at law. These amounts are often payable in respect of an individual and sometimes in respect of a group of individuals. Such calculations must often be performed within a framework established by legislation and/or legal precedent.
- .02 Payment of the capitalized value is an alternative to payment of defined amounts to which an individual is entitled. Often the courts and others have recourse to payment of a capitalized value when payment of the amounts comprising that value is not practical or not desired.
- .03 Calculation of the capitalized value is within the domain of actuarial practice. The decision to have recourse to the capitalized value is outside the domain of actuarial practice.
- .04 A capitalized value relates to amounts payable at various times, each subject to various contingencies related to the individual or to the individual's dependants. Examples of such amounts are:

<u>Event</u>	<u>Capitalized Value of the Individual's:</u>
Disability	Loss of earnings, loss of household services and/or cost of extraordinary expenses attributable to the disability, also referred to as cost of future care.
Death	Dependants' loss of financial support and/or loss of household services.
Wrongful dismissal	Loss of earnings, pension benefits and/or employer-sponsored benefits other than pensions.
Marriage breakdown	Pension benefits, support obligations.
Reversion	Amounts payable on certain contingencies.

## 4130 METHOD

- .01 *The actuary should calculate the capitalized value of future amounts payable in respect of an individual by the actuarial present value method. [Effective January 1, 2004]*

### Actuarial Present Value Method

- .02 It has been said that the laws of probability do not apply to an individual. That is partly correct. The laws of probability cannot be used to predict with respect to an individual. In a given year, for example, the expected rate of death for an individual is, say, .001, but that individual actually dies in that year at a rate which is either 1 or 0; i.e., either dies or does not die. We can predict only that, if there are, say, 1,000,000 similar individuals, then 1,000 of them, more or less, will die during the year. However the actuarial present value method, fairly and reasonably, applies the laws of probability to an individual in order to calculate the capitalized value of amounts payable in respect of the individual. It must be recognized, however, that, while the capitalized value may serve as a reasonable proxy to the series of payments for an *average* individual, it may be too much or too little for a *particular* individual. For example, a particular individual may live for a longer time, or be disabled for a shorter time, than an average individual. Thus there will be, for a particular individual, either overcompensation or undercompensation. Under the actuarial present value method, the present value of possible overcompensation is balanced by the present value of possible undercompensation.
- .01 It is not appropriate to calculate the capitalized value of amounts subject to any contingent event as the present value of an annuity certain.

## 4140 FINANCIAL INTEREST OF THE ACTUARY

- .01 *The amount of the actuary's compensation should not be related to the outcome of the matter (e.g. litigation) in connection with which the work is done. The actuary may, however, reduce or waive his or her usual fee in hardship cases. [Effective January 1, 2004]*

## 4150 TESTIMONY

- .01 *The actuary's testimony should be objective and responsive. [Effective January 1, 2004]*
- .02 The actuary's role as an expert witness in court is to assist the court in its search for truth and justice and the actuary is not to be an advocate for one side of the matter in a dispute.

- .03 In the course of testifying before the court, the actuary would:
- present a balanced view of the factors surrounding the actuarial aspects of the questions put to him or her,
  - answer all the questions that are asked on the basis of his or her own best assessment of all the relevant factors, and
  - apply best efforts to ensure that the testimony is clear, complete, that the information the actuary is providing will not be misunderstood or misinterpreted and that the audience will be able to use it correctly.
- .04 When responding to a direct question relating to any error or shortcoming the actuary perceives in the report of another actuary or expert witness, the actuary would respond candidly, notwithstanding paragraph 4160.05.

4160.05

### **4160 REPORTING: EXTERNAL USER REPORT**

- .01 *The actuary should describe:*
- the benefits to which the capitalized value applies,*
  - the assumptions and methods which are constrained by statute or case law,*
  - the data, method, and assumptions for the calculation, and*
  - the results of the calculation,*
- in sufficient detail to enable another actuary to approximately reproduce the calculations.*
- .02 *The report should:*
- include any applicable standard reporting language, and*
  - identify the person for whom the report was prepared and, if that person is acting on behalf of a party to the dispute, that party to the dispute. [Effective January 1, 2004].*

### **Reporting with Reservation**

- .03 Stating that the reporting requirements have not been followed does not excuse an actuary from these reporting standards.
- .04 Reporting with reservation may relate to insufficient or unreliable data, or to the use of more approximate calculations than would normally be used due to time and expense constraints, but in no event shall reporting with reservation excuse an actuary from these reporting standards.

**Disclosure of other expert's error**

- .05 The external user report need not disclose any error or shortcoming which the actuary perceives in the report of another actuary or other expert witness.

1410.08

**4170 REPORTING: INTERNAL USER REPORT**

4150.04

- .01 *Unless an internal user report conforms to the recommendation for an external user report, an internal user report should contain a proviso that it not be given to an external user or be used in a court proceeding.* [Effective January 1, 2004].
- .02 For the purpose of determining if the actuary is following standards, an internal user report continues to be an internal user report even if, in breach of the proviso required by 4170.01, it is given to an external user or used in court. The actuary would draft any follow-up report as an external user report if a similar breach seems likely.

## **4200 CAPITALIZED VALUE OF AMOUNTS FOR OTHER THAN PENSION PLAN BENEFITS FOR A MARRIAGE BREAKDOWN**

### **4210 METHOD**

#### **Past Loss**

- .01 In some cases, the capitalized value is the present value of amounts payable both before and after the date at which the capitalized value becomes payable. In an accident caused by negligence, litigation of the damages may result in the capitalized value becoming payable several years after the accident. The damages then consist of those in respect of both the period before and the period after the date at which the capitalized value becomes payable, called “past losses” and “future losses” respectively.

#### **Tax Calculations**

- .02 The actuary would deal appropriately with income tax considerations, taking account of applicable law, ensuring that the whole of the actuary’s report deals with income tax in an internally consistent way, and fully disclosing assumptions and methods used in quantifying its impact.

#### **Investment Expenses**

- .03 Depending upon applicable law and the terms of the actuary’s engagement, an additional augmentation may be made to the initial fund, to allow for the present value of the expense of retaining advice or hiring an administrator, in connection with the management of the fund’s investments.

### **4220 CONTINGENCIES**

- .01 *The actuary should consider directly incorporating any material contingency where, in the actuary’s opinion, there are adequate legal, theoretical, or empirical supporting grounds to enable this. . The actuary should disclose the omission from the model of any contingencies he or she considers material. [Effective January 1, 2004]*



- .02 *If the actuary gives advice on the impact of a contingency that is not incorporated in the model used, that advice should be based on an assessment of that contingency, both alone and in combination with other factors, using appropriate actuarial methods. [Effective January 1, 2004].*
- .03 The actuary's report would show the results of the actuarial calculation based on the application of the model, and with any provision for other contingencies not incorporated in the model as a separate adjustment. For example, the results of the actuarial calculation may include precise recognition of only net investment return and mortality, and any other provision for contingencies reported as a separate adjustment.
- .04 The actuary would comment on every contingency that has been taken into account in making the calculations. The actuary would also state there may be other contingencies which could have a positive or negative impact and which have not been taken into account.
- .05 Recognition of a contingency may create a positive or negative impact on a calculation.

#### **4230 ASSUMPTIONS**

- .01 *The actuary's assumptions to calculate the capitalized value of amounts payable in respect of an individual should be best estimate assumptions unless there is a reason for biased assumptions. Except where the assumption is required by law, the actuary should report any such reason and the resulting bias. [Effective January 1, 2004]*
- .02 *The actuary should ensure that any assumptions selected by the client are plausible, taking account of applicable law, and that they do not conflict with prescribed assumptions. [Effective January 1, 2004]*
- .03 *In reporting, the actuary should identify which assumptions have been selected by the client. [Effective January 1, 2004]*
- .04 Where there is insufficient data to support a particular assumption regarding a contingency incorporated in the model, the actuary may present results based on high and low estimates.
- .05 Requirement by law is a satisfactory reason for using a biased assumption.
- .06 If facts needed to make an appropriate assumption are lacking, then the actuary may report values for a helpful range of described assumptions.

#### **4240 APPLICATION OF LAW**

- .01 In a situation where statute or case law specifies a method or assumption to be adopted in an actuarial evidence calculation, a broad interpretation of accepted actuarial practice is applied, so that in most such situations the statute or case law specification is within the range of accepted actuarial practice.
- .02 If the actuary were unsure as to whether such a specification is accepted actuarial practice, he or she would consult with the chair of the Committee on Actuarial Evidence.

## 4250 REPORTING: EXTERNAL USER REPORT

.01 Here is model text if the actuary reports without reservation:

1610.02

I have determined the capitalized value of those aspects of the pecuniary damages described herein and prepared this report in accordance with accepted actuarial practice. It is my opinion that the assumptions and methods I have taken responsibility for are appropriate in the circumstances of this case and for the purpose of this report.

Respectfully submitted,

[actuary]

Fellow, Canadian Institute of Actuaries

**4300 CAPITALIZED VALUE OF PENSION PLAN BENEFITS  
FOR A MARRIAGE BREAKDOWN**

**4310 SCOPE**

- .01 The standards in this Section 4300 apply to an actuary's advice when the capitalized value of a pension plan's benefits is needed for calculating the value of family property at the breakdown of the marriage of a plan member.
- .02 For the purposes of this Section 4300, "plan" means "pension plan" and is broadly defined, including not only a plan which is registered under the *federal Income Tax Act* but also an unregistered plan, such as a retirement compensation arrangement and an unfunded pension plan.
- .03 The standards in this Section 4300 do not apply when the purpose of the calculation is to calculate an amount, in respect of a pension benefit to be paid :
- by the plan to the plan member or beneficiary as a result of the plan member's death or termination of membership; or
- by a party other than the plan in connection with litigation other than in respect of marriage breakdown.
- .04 The standards in this Section 4300 may provide useful guidance for corresponding calculations for other deferred compensation arrangements, such as a partnership retirement buy-out agreement, a sick leave buy-out plan, and a retirement lump sum allowance, but they do not provide useful guidance for current compensation arrangements, such as group life and disability insurance.

**4320 METHOD**

- .01 *The benefits to be valued are the plan's benefits in respect of the member (including survivor benefits vested in the member's spouse) at the calculation date or calculation dates. [Effective January 1, 2004]*
- .02 *The value of the member's benefits is the capitalized value of the benefits to be valued, but assuming that the member has no spouse. The value of the survivor benefits vested in the member's spouse is the excess, if any, of*
- the capitalized value of the benefits to be valued over*
- the value of the member's benefits. [Effective January 1, 2004]*

**Principle**

- .03 The capitalized value would conform to the intent of applicable family law. The capitalized value may thus differ from the corresponding transfer value from a registered pension plan. Transfer values typically include only unconditional rights, whereas property under family law typically includes both vested and contingent rights. Thus, such contingent rights as early retirement rights, bridging benefits, and ad hoc inflation adjustments are property to be considered in a valuation for marriage breakdown purposes.
- .04 The standards in this section will often produce more than one result, by taking account of alternative possibilities for
- pension commencement age,
  - future increases in accrued benefits before and after retirement,
  - allocation of value earned before marriage,
  - inclusion or exclusion of non-vested benefits,
  - special circumstances, such as buy-back or transfer of benefits.
- .05 If the actuary has reason to believe that the Plan's financial position is so weak that payment of the capitalized benefits is doubtful, then the actuary would so report, making clear that allowance for this factor could significantly reduce the present values calculated, given that such present values have been calculated assuming that the Plan would meet its obligations. In making that assessment, the actuary would take into account any benefits payable under provincial pension guarantee legislation. The actuary would further take into account the extent to which Plan benefits are provided through a retirement compensation arrangement and/or an unfunded pension plan.
- .06 The terms of the actuary's engagement may determine some or all of the following:
- the relevant law or jurisdiction,
  - the calculation date or calculation dates,
  - retirement age, but only if established as a matter of fact pursuant to an agreement of the parties or a determination by the court,
  - inclusion or exclusion of the effect of income taxes.

**Benefits to be valued**

- .07 The benefits to be valued would include all of the plan's contractual benefits, including pre- and post-retirement death benefits and any contractual inflation protection and non-contractual inflation protection.
- .08 The benefits to be valued would exclude spousal survivorship benefits, except to the extent that these may have vested upon retirement prior to the calculation date.
- .09 The form of plan benefits that would be valued would be the most favourable of any optional form available to the member with no spouse. For example, a 15-year guaranteed pension option would have a greater value than a 5-year guaranteed pension option for a member with impaired mortality. However, if the applicable law disregards a particular optional form of plan benefit, then the actuary may omit that option in calculating the capitalized value.
- .10 The benefits may include or exclude any non-vested benefits. Non-vested benefits may be included in the values, or illustrated separately, and would be valued without discount for the possibility of future forfeiture. Separately from the illustrated values, the report may contain comments including suggestions for recognizing the contingent nature of non-vested benefits.

The references in this paragraph to inclusion of values of non-vested benefits apply in jurisdictions where the inclusion of such values depends on the plan provisions applicable to a deferred vested member. In other jurisdictions, the inclusion of such values depends on the extent to which continued employment is assumed.

- .11 The capitalized values would include ancillary benefits which are provided by the plan as of the calculation date and are expected to become available to the member after the calculation date if the plan member continues as an active member of the plan, but are not available to the member as of the calculation date, such as unreduced early retirement benefits.
- .12 The actuary would disclose whether or not the benefits valued include benefits that will be provided by the plan after the calculation date and that are expected to become available to the member after the calculation date if the plan member continues as an active member of the plan, but are not available to the member as of the calculation date, for example
  - a future increase in benefits as a result of a collective bargaining agreement,
  - a future increase in benefits as a result of an adopted plan amendment.
- .13 The benefits referred to in paragraph .11 are those payable by the plan as a going concern, and not those payable on plan wind-up, if different.

- .14 Where various legal interpretations for a specific question appear possible, the actuary would obtain clarification of such unclear matter from the instructing lawyer or from another authoritative source. If that is not possible, the actuary would provide a description of any conflicting viewpoints and report either values that represent both possible interpretations, or values that, in the actuary's opinion, are most consistent with accepted actuarial practice.

### Calculation date

- .15 The calculation date may be single or multiple, depending on the circumstances and applicable law. The possibilities include
- the date of separation,
  - the date of marriage or commencement of cohabitation,
  - the date of trial, and
  - the report date.
- .16 If the selection of an alternative nearby calculation date would significantly affect the capitalized value, then the actuary would so report. Examples are
- the date at which the member becomes eligible for early retirement with unreduced benefits, and
  - the date at which the plan is amended to enhance its benefits.

### Applicable standards

- .17 The applicable standards are those in effect at the calculation date. If there are two or more calculation dates, however, and if the standards applicable to one differ from the standards applicable to another, then the actuary would use the same standards for all calculation dates. The choice of standards would be governed by the latest of the calculation dates, except that the choice would be governed by the base calculation when the actuary selects an alternative nearby calculation date in accordance with the previous paragraph.

### Future service

- .18 If the member's employment terminated before the calculation date and was not reinstated at the report date, then the actuary would include nothing in the capitalized value on account of assumed service after the calculation date, even if reinstatement is possible after the report date. The actuary may, however, report a useful alternative calculation, which assumes reinstatement.
- .19 If the member's employment terminated between the calculation date and the report date and was not reinstated at the report date, then the actuary may, with disclosure, exclude from the capitalized value any non-vested benefits forfeited by the termination of employment.

**Effect on capitalized value of minimum benefits**

- .20 In calculating the capitalized value, the actuary would take account of any minimum benefit related to member contributions, for example:

the so-called “50% minimum employer contribution rule”, and

a minimum benefit equal to the member’s contributions accumulated with interest.

- .21 The minimum benefit would not necessarily be limited only to the value determined on a termination of employment assumption. The capitalized value would incorporate the relevant minimum benefit rule according to the event.

**Effect on capitalized value of salary increases after the calculation date**

- .22 If the pension is an earnings-related benefit, then the possibilities are as follows:

The capitalized value takes account of all the member’s salary increases—general increases, promotional increases, and seniority increases – after the calculation date.

The capitalized value takes account of the member’s salary increases which result from general (as opposed to promotional and seniority) salary increases after the calculation date. A rationale for this possibility is that the member’s spouse has no entitlement to the effect of promotions or seniority increases, which the member earns after the calculation date.

The capitalized value does not take account of the member’s salary increases after the calculation date. A rationale for this possibility is that the member’s spouse has no entitlement to the effect of salary increases, which depend on the member’s continued employment after the calculation date.

- .23 The assumed salary increases after the calculation date would be consistent with the prescribed economic assumptions, except that salary increases revealed by subsequent events would be substituted for the corresponding assumed increases.

**Effect on capitalized value of non-contractual indexing of pensions and other benefit adjustments**

- .24 In calculating the capitalized value, the actuary would assume continuance of the plan’s established practice or current policy, if any, for non-contractual indexing for inflation of pensions after pension commencement age and of vested deferred pensions before pension commencement age, unless there is explicit reason not so to assume. The actuary would report

the established practice or current policy, and

the assumption.

- .25 If that assumption is doubtful, then the actuary would also report the numerical effect on the capitalized value of helpful alternative assumptions.
- .26 In the case of a final or best average earnings plan, there should be no allowance made for indexing of vested deferred pensions before pension commencement age in the period for which salary increases are projected after the calculation date.

### **Effect on capitalized value of income tax**

- .27 Income tax may be taken into account in the calculation. If it is to be taken into account, then the actuary would do so by calculating the average income tax rate based upon the member's anticipated retirement income computed in "current" dollars, including accrued and projected future pension income, Canada Pension Plan, Old Age Security and other anticipated income, and continuance of the tax environment at the report date or the calculation date; i.e. assuming continuation of the existing tax rates, brackets, surtaxes and clawbacks, applied to the projected income on retirement expressed in "current" dollars. The actuary would disclose which date was used and if the tax environment is as at the report date, disclose the use of any tax provisions that have not yet been enacted.
- .28 The actuary may report useful alternative calculations, which take income tax into account.

### **4330 ASSUMPTIONS**

- .01 *The actuary should select all assumptions, except those depending upon interpretation of applicable law. [Effective January 1, 2004].*

#### **Death rates**

- .02 *The actuary should assume death rates in accordance with a mortality table prescribed by the Practice Standards Council for the purpose of these calculations, modified, if appropriate, to reflect the member's or the member's spouse's impaired health, if medically determinable. [Effective January 1, 2004]*
- .03 Tobacco use (or lack of tobacco use) would not, in itself, be sufficient reason to modify the above-described death rates.
- .04 Use of unisex death rates would not be appropriate except that it may be appropriate in situations where the plan member has terminated employment and has elected or has the option to elect a transfer value.

#### **Retirement age**

- .05 If the retirement age is a matter of fact (i.e., one agreed by the parties or determined by the court), then the actuary would report the selection of the assumed retirement age as such.
- .06 The retirement of the member before the report date does not necessarily preclude assumption of a different retirement age.
- .07 Unless paragraph .05 applies, the actuary would usually assume and report the results for a



range of useful retirement ages, based on data at the calculation date, which would include

the earliest age at which the member is entitled to a pension whose amount is not reduced on account of early retirement, assuming that the member's service ceases at the calculation date,

the earliest age at which the member is entitled to a pension whose amount is not reduced on account of early retirement, assuming that the member continues in service either to that age or to an earlier age after the calculation date,

if there is an upper limit to the number of years of credited service, the earliest age at which the member has attained, or will attain, that upper limit and becomes entitled to a pension whose amount is not reduced on account of early retirement, and

the normal retirement age.

### **Valuation interest rates**

- .08 The choice of valuation interest rate would vary depending on whether the pension is non-indexed, partially indexed, or fully indexed.
- .09 The index may be the Consumer Price Index (CPI), a wage index, an index based on an excess interest method, or a modification or a mixture of these indices.

### **Pension which is non-indexed**

- .10 The valuation interest rate during the 15 years following the calculation date is the month-end value of the nominal interest rate (i.e., the rate compounded semi-annually) on long-term Government of Canada bonds (CANSIM series B14013) in the second calendar month preceding the month in which the calculation date falls, adjusted as follows:
  - add 0.5%,
  - convert the resulting nominal interest rate to the equivalent effective annual interest rate, and
  - round to the nearest integral multiple of 0.25%.
- .11 The valuation interest rate after those 15 years is 6%.

### **Pension which is indexed to the CPI**

- .12 The valuation interest rate during the 15 years following the calculation date is the month-end value of the real interest rate (i.e., the rate compounded semi-annually) on long-term Government of Canada real return bonds (CANSIM series B14081) in the second calendar month preceding the month in which the calculation date falls, adjusted as follows:
  - add 0.25%,
  - convert the resulting nominal interest rate to the equivalent effective

annual interest rate, and

round to the nearest integral multiple of 0.25%.

- .13 The valuation interest rate after those 15 years is 3.25%.

**Pension which is indexed to a wage index**

- .14 If a pension is indexed to the rate of change in a wage index, the valuation interest rate would be 1% less per annum than the rate determined for CPI indexing under paragraphs 4330.12 and 4330.13

**Pension which is ad hoc indexed**

- .15 For a pension in a plan which has a policy or a history of *ad hoc* indexing, the actuary shall determine a valuation interest rate based on an assumed rate of indexing determined in accordance with paragraph 4330.18.

4330.18

**Other Adjustments**

- .16 The capitalized value of a fully or partially indexed pension would be adjusted, if necessary, to be as large as the corresponding value of an otherwise similar non-indexed pension. That adjustment may be necessary if the indexing decreases the pension.
- .17 The indexing in any of the above arrangements may be modified by
- applying a maximum or minimum annual increase, with or without carry forward of excesses or deficiencies to later years, or
  - prohibiting a decrease in a year where the application of the formula would otherwise cause a decrease. The actuary would then adjust the interest rate for a year to reflect the probability and extent of modification for that year. In so doing, the actuary would take account of long-term historical averages and not give undue weight to recent experience.
- .18 If the pension is indexed to the CPI on some basis other than the full CPI, the capitalized value would be reasonably related to the capitalized value for pensions which are non-indexed and which are indexed to the CPI.
- .19 If the pension is indexed using an “excess investment return” approach, the valuation interest rate would usually be the lesser of the “floor rate” and the valuation interest rates determined under paragraphs 4330.10 and 4330.11.

**Assumptions selected by client**

- .20 The actuary would obtain instructions from the client with respect to assumptions dependent upon the interpretation of applicable law.
- .21 The actuary would report his or her reliance on an assumption selected by the client.

**4340 REPORTING: EXTERNAL USER REPORT**

- .01 Here is model text if the actuary reports without reservation with regard to Marriage Breakdown:

I have determined the capitalized value of the pension benefits and prepared this report in accordance with accepted actuarial practice, for purposes of settlement of a division of pension benefits resulting from marriage breakdown under the [Family Law Act] of [province]. In my opinion, the capitalized values are appropriate for this purpose.

Respectfully submitted,

[actuary]  
Fellow, Canadian Institute of Actuaries

## 4400 COMPUTATIONS OF CRIMINAL RATE OF INTEREST

### 4410 SCOPE

- .01 *The standards in Section 4400 apply to an actuary's advice when determining whether the interest rate for a particular agreement or arrangement is a "criminal rate". [Effective January 1, 2004].*
- .02 *The Criminal Code of Canada defines "criminal rate" as meaning an effective annual rate of interest calculated in accordance with generally accepted actuarial practices and principles that exceeds sixty percent on the credit advanced under an agreement or arrangement.*

### 4420 DATA

- .01 *The actuary should ascertain or make assumptions regarding the quantum and timing of all amounts actually or deemed to be advanced as well as all amounts actually or deemed to be repaid either as principal or as "interest" as defined in the Criminal Code. [Effective January 1, 2004]*
- .02 *All data used in the calculation, and their sources, should be reported. [Effective January 1, 2004]*
- .03 *Data which are not clear from the initial terms of the assignment would require clarification from the actuary's client (for example, whether or not a particular item falls within the statutory definition of "interest," or the timing of a particular payment that could be made on various alternate dates).*

### 4430 METHOD

- .01 *The actuary should calculate and report the effective rate of interest compounded annually "i" such that the following equality is established.*

$$\sum_{r=1}^m A_r \times (1+i)^{t_r} = \sum_{s=1}^n B_s \times (1+i)^{t_s}$$

where:

*m is the total number of payments advanced by the lender to the borrower.*

*n is the total number of payments repaid by the borrower to the lender.*

*A<sub>r</sub> is the amount of the r<sup>th</sup> payment advanced by the lender.*

$B_s$  is the amount of the  $s^{\text{th}}$  payment repaid by the borrower, consisting of principal, “interest” as defined, or a combination of both.

$t_r$  is the period measured in years (including fractional parts of a year) between the time that the  $r^{\text{th}}$  payment is advanced by the lender to the borrower and the time on which the final repayment is made by the borrower to the lender.

$t_s$  is the period measured in years (including fractional parts of a year) between the time that the  $s^{\text{th}}$  payment is repaid by the borrower to the lender and the time on which the final payment is made by the borrower to the lender. [Effective January 1, 2004]

- .02 If the calculation produces only one result, then the actuary would report that result. If the calculation produces more than one result, then the actuary would report only those which are positive and real.
- .03 The formula in paragraph 4430.01 applies in most but not all situations.