

*SOA Course FM*  
*CAS Exam 2*  
*Flashcards*

*Spring 2009*

*Important formulas*

*Key lists*

*Crucial concepts*

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## *CONTENTS*

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## *HOW TO USE THESE FLASHCARDS*

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These flashcards are designed to help you memorize important formulas efficiently in your preparation for the Course FM exam. It is extremely important for a mathematically intensive, multiple choice exam that you thoroughly understand important formulas and how to apply them under stressful exam conditions. Once you have this mastered, you will have a competitive advantage over most of the other students taking the exam that will provide a level of confidence that should result in a passing score.

The left hand-sides of important formulas are presented on even-numbered pages, while the complete formulas are presented on odd-numbered pages. This format is designed to quickly improve your memorization of the important formulas. We suggest using a blank sheet of paper to conceal the complete formulas on the odd pages as you look at the incomplete formulas on the even pages. As you work your way through the incomplete formulas on the even pages, you can gradually reveal the complete formulas by shifting the blank sheet of paper down the even-numbered pages.

For a multiple choice exam, memorization of lists is not as important as being able to recognize items within a list when they are presented. Course FM / Exam 2 is not an essay exam, so you will not be asked to recite a memorized list, but you will be asked about whether or not an item in a list is appropriate in the context of the question.

We have designed these flashcards so that they can be carried conveniently and read frequently in the final run-up to the exam. Check each section when you feel confident with the material covered.

Each person has a different approach to learning. While we have tried to be reasonably complete with the flashcards, some students may prefer to derive some of the formulas while others may prefer to memorize them all. These flashcards cannot possibly cover everything that will ever appear on the Course FM exam since they would become too unwieldy and ultimately less useful for the student. So we hope that you will personalize these flashcards by adding your own formulas, comments, and notes to help you pass the exam.

Good luck with your studying.

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## *FINANCIAL MATHEMATICS*

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### *Level annuity factors*

#### **Annuity-immediate present value factor**

$$a_{\overline{n}|i} =$$

#### **Annuity-immediate accumulated value factor**

$$s_{\overline{n}|i} =$$

#### **Annuity-due present value factor**

$$\ddot{a}_{\overline{n}|i} =$$

#### **Annuity-due accumulated value factor**

$$\ddot{s}_{\overline{n}|i} =$$

#### **Annuity-due factors in terms of annuity-immediate factors**

$$\ddot{a}_{\overline{n}|i} =$$

$$\ddot{s}_{\overline{n}|i} =$$

#### **Deferred annuity present value factors**

$$m|a_{\overline{n}|i} =$$

$$m|\ddot{a}_{\overline{n}|i} =$$

**Level annuity factors**

**Annuity-immediate present value factor**

$$a_{\overline{n}|i} = \frac{1 - v^n}{i} = v^n s_{\overline{n}|i}$$

**Annuity-immediate accumulated value factor**

$$\begin{aligned} s_{\overline{n}|i} &= \frac{(1+i)^n - 1}{i} \\ &= (1+i)^n a_{\overline{n}|i} \end{aligned}$$

**Annuity-due present value factor**

$$\ddot{a}_{\overline{n}|i} = \frac{1 - v^n}{d} = v^n \ddot{s}_{\overline{n}|i}$$

**Annuity-due accumulated value factor**

$$\begin{aligned} \ddot{s}_{\overline{n}|i} &= \frac{(1+i)^n - 1}{d} \\ &= (1+i)^n \ddot{a}_{\overline{n}|i} \end{aligned}$$

**Annuity-due factors in terms of annuity-immediate factors**

$$\ddot{a}_{\overline{n}|i} = 1 + a_{\overline{n-1}|i} = (1+i)a_{\overline{n}|i}$$

$$\ddot{s}_{\overline{n}|i} = s_{\overline{n+1}|i} - 1 = (1+i)s_{\overline{n}|i}$$

**Deferred annuity present value factors**

$${}_m|a_{\overline{n}|i} = v^m a_{\overline{n}|i}$$

$${}_m|\ddot{a}_{\overline{n}|i} = v^m \ddot{a}_{\overline{n}|i}$$

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## *FINANCIAL MATHEMATICS*

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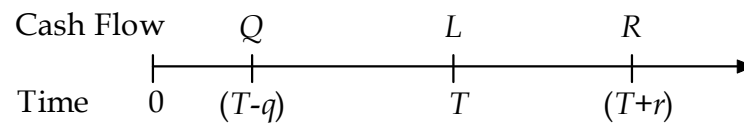
### Surplus

$$S(y) =$$

### Conditions for Redington immunization

- 1.
- 2.
- 3.

### Conditions for full immunization of single liability cash flow



- 1.
- 2.
- 3.

### Dedication

Dedication is also known as \_\_\_\_\_.

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## *FINANCIAL MATHEMATICS*

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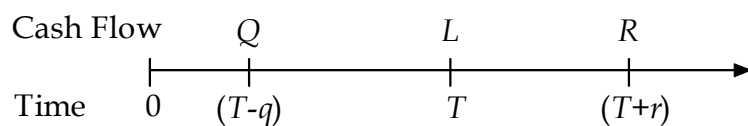
### Surplus

$$S(y) = PV_A - PV_L$$

### Conditions for Redington immunization

1. Present value of assets = Present value of liabilities
2. Duration of assets = Duration of liabilities
3. Convexity of assets > Convexity of liabilities

### Conditions for full immunization of single liability cash flow



1. Present value of assets = Present value of liability
2. Duration of assets = Duration of liability
3. The asset cash flows occur before and after the liability cash flow. That is:

$$(T - q) < T < (T + r)$$

### Dedication

Dedication is also known as cash flow matching.