

EA-1
OVERHEADS

Interest Theory
Life Contingencies

SPRING 2012

OVERHEAD SECTIONS

1. GENERAL
2. INTEREST RATES
3. ANNUITIES CERTAIN
4. LOANS
5. BONDS
6. INVESTMENT YIELDS
7. LIFE CONTINGENCIES
8. LIFE ANNUITIES
9. INSURANCE VALUES
10. JOINT LIFE STATUS
11. ACTUARIAL EQUIVALENCE
12. MULTIPLE DECREMENTS
13. POPULATION THEORY
14. INTERESTING PROBLEMS

SECTION 1

GENERAL

EXAM CONDITIONS

1. Normal Retirement Age (NRA) is 65
2. Pension commences at NRA,
payable monthly for life @ begin. of
month
3. No pre-retirement death benefits
4. Actuarial equivalence is based on
mortality / interest for funding
5. Interest rates compounded more
frequently than annually are
expressed as nominal rates

EXAM CONDITIONS - CONTINUED

6. With multiple lives, future lifetimes are assumed to be independent of each other
7. “Gross single premium” is equivalent to “Contract single premium”, and “Net single premium” is equivalent to “Benefit single premium” (and similarly for annual premiums)
8. There are no policy loans in effect
9. Bond redemption value = face amount
10. Interest rate == yield rate
11. Duration == Macaulay duration

GUIDELINES

1. Old Exams Too Simple
2. Good Multifunction Calculator
3. Read Questions Carefully
4. Know All Conditions
5. Avoid Arithmetic Errors - Compare Answer To Ranges
6. Calculator “Tricks”
7. $\ddot{a}_{65}^{(12)} = \ddot{a}_{65} - 11/24$

IMPLIED RANGES

Sample Answer Ranges:

A <10,000

B 10,000 - 10,500

C 10,500 - 11,000

D 11,000 - 11,500

E 11,500 ++

Which answers may be the result of arithmetic errors?

5,000	9,000
9,800	12,500

IMPLIED RANGES HISTORICAL ANALYSIS

Number of questions where numerical answer is outside of A/E implied ranges

OLD EA-1A EXAMS

1985-2000: 2 OF 85 O/S implied range

CONCLUSION:

You can know when an A/E answer may be bad. Normally will fall within the implied range!

SUMMARY OF EA-1 PROBLEMS BY TYPE (INCLUDING 2010)

INTEREST TOPICS	2010 Exam	2009 Exam	2008 Exam	2007 Exam	2006 Exam	2005 Exam	2004 Exam
Identities: calculate i , $\ddot{a}_{\overline{n} }$, $\ddot{s}_{\overline{n} }$, etc.		01, 08, 27, 28	06, 07	05, 11	09	08	
Yield curve / spot rates	22, 24, 27, 29	03, 16, 20	02, 28	19	21, 22		
Profit sharing / money purchase account bal	01, 23	07	01, 05	14	17	11, 18	02
Increasing annuity / perpetuity	08	14		06, 07 21	25		03, 08, 16, 25
Sinking funds		21	09				17
Loans – “Simple”	13, 18		13		01		09, 27
Loans – Renegotiated provisions		29	16	13	05	10	07
Loans – Multiple interest rates				12		03, 25	
Bonds – “Simple”	07			26	06, 13		01, 28
Bonds – Callable	21					21, 22	04
Bonds – Serial		15		25		02	23
Bonds – Yield rate							32
Duration, modified duration	16	09	08		12, 18	19	
Time / dollar weighted return	10, 20	34, 35	14, 17	20, 27	02	01	10
OTHER			27				

LIFE CONTINGENCIES	2010 Exam	2009 Exam	2008 Exam	2007 Exam	2006 Exam	2005 Exam	2004 Exam
Select and ultimate decrements	11, 28	12	22	08	07, 24	27	
Identities with l_x , ${}_np_x$, u_x , e_x , etc.	02, 17	02, 04, 26, 30	12, 19, 24	02, 03 15, 29		23	21, 24
PV calc - simple, or salary scale	26, 31	05, 17, 18	26	01, 09		06, 16	
Annuity under DeMoivre’s law	04	06	25			09	
PV of non-level annuity or insurance			03, 11	18	16	17	18
Miscellaneous death benefit, usually pre-ret				10	14, 26		05
Insurance premium (net)		11	10, 21, 29	16	03, 30	05	
Gross premium calculations							
Reversionary Annuity	06		04	17	04, 15		06, 12
Actuarial Equivalence: J&S form	03, 09, 14	23, 24		30	27	04, 07 29	19
Actuarial Equivalence: Simple types	12		20	04		15, 24	13, 14, 15
Balducci / Constant Force / UDD assumption	15	31	23	28, 31	10, 19 29	13, 14 20	11, 22, 29
Multiple decrement tables	19, 25	10, 13, 19, 25, 32	18, 30	22, 24	11, 23 28	12, 26 28	20, 31
Population theory	05		15	23	08, 20		30
OTHER	30	22, 33	31				26

OPENING / CLOSING COMMENTS

READ	Overheads - key background for each exam topic area
WORK	Prior exam problems
EXPECT	Similar problems as last 5 years
STUDY	"New stuff" in last 5 years' exams
REVIEW	Lengthy exam solutions give background of WHY - not just HOW to solve problem
NEXT STEPS	PRACTICE, PRACTICE, ETC. Be speedy in working problems
EMAIL	Follow-up questions, clarifications after the seminar