QUEEN MARY, UNIVERSITY OF LONDON

MAS200 Actuarial Statistics

Key Objectives Spring 2002

To obtain a pass in the examination, you should be able to do all of the following.

(1) Understand the meaning of

δ, force of interest;
$i^{(p)}$, nominal rate of interest convertible $p$thly;
$d^{(p)}$, nominal rate per annum of discount convertible $p$thly;
$\ddot{a}_{\overline{n}|}$, present value of annuity-due;
$a_{\overline{n}|}$, present value of immediate annuity.

(2) Calculate the accumulated value of a single investment when one of the following is given:

force of interest δ;
effective annual rate of interest i or effective annual rate of discount d;
nominal rate of interest $i^{(p)}$ or nominal rate of discount $d^{(p)}$;

(3) State and apply the relationships between:

δ, v, d, and i;
$i^{(p)}$ and i, nominal and effective rates of interest;
$d^{(p)}$ and d, nominal and effective rates of discount;

(4) Apply the equation of value and *calculate* the present value of annuities payable annually and the present value of a single investment.

(5) Define the survival function $s(x)$ in terms of the time-until-death for a newborn. Define the force of mortality $\mu(x)$.

(6) Define the meaning of the life table functions l_x, ${}_tp_x$, ${}_tq_x$, ${}_{t|u}q_x$ and *calculate* them on the basis of a life table.

(8) Express ${}_tp_x$, ${}_tq_x$ and ${}_{t|u}q_x$ in terms of l_x and $s(x)$ and calculate them for a constant force of mortality.

(9) Understand the concept of select mortality. *Use* life tables to find select and non-select (ultimate) values of the life table functions.

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(10) Understand what is meant by a life annuity. *Calculate* the expected present values of whole-life ($\ddot{a}_x$ and a_x) and temporary annuities ($\ddot{a}_{x:\overline{n}|}$) payable annually on the basis of A1967-70.

(11) Understand what is meant by the benefit payment under whole-life assurance and n-year term endowment policies. *Calculate* the expected present value of the benefit payment on the basis of A1967-70 (using (10) and the conversion relationships).

(12) Understand what is meant by the benefit payment under a pure endowment policy. *Calculate* the expected present value of the benefit payment on the basis of ELT-12 and A1967-70.

(13) Understand how the benefit premiums for life assurance policies are calculated (the equivalence principle). *Calculate* these on the basis of A1967-70.

Duration of the examination will be two hours. The rubric will be as follows.

> *You may attempt as many questions as you wish and all questions carry equal marks. Except for the award of a bare pass, only the best THREE questions will be counted.*
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> *You are permitted to use an electronic calculator in this examination but you may not use any preprogrammed or graphical features which it may have. Please state on your answer book the name and type of machine used.*