

Actuarial Study Materials Learning Made Easier

Flashcards for SOA Exam LTAM 1st Edition, 5th Printing

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Three formulas for $_{t|u}q_x$ *in terms of non-deferred* p*'s and* q*'s*

Survival Distributions

$$t|_{u}q_{x} = tp_{x} uq_{x+t}$$

$$t|_{u}q_{x} = tp_{x} - t + up_{x}$$

$$t|_{u}q_{x} = t + uq_{x} - tq_{x}$$

Lesson 3, page 28, Table 3.1

$_{k}p_{x}$ in terms of l's

Survival Distributions

$$_{k}p_{x} = \frac{l_{x+k}}{l_{x}}$$

Lesson 3, page 28, Table 3.1

$_kq_x$ in terms of l's and d's

Survival Distributions

$$_{k}q_{x} = \frac{_{k}d_{x}}{l_{x}} = \frac{l_{x} - l_{x+k}}{l_{x}}$$

Lesson 3, page 28, Table 3.1

$t|_{u}q_{x}$ in terms of l's and d's

Survival Distributions

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$$_{t|u}q_x = \frac{_{u}d_{x+t}}{l_x} = \frac{l_{x+t} - l_{x+t+u}}{l_x}$$

Lesson 3, page 28, Table 3.1

Definition of $_tq_x$ in terms of probabilities of X, the random variable for age at death.

Survival Distributions

$_t q_x = \Pr(x < X \le x + t \mid X > x)$

Lesson 3, page 28, Table 3.1

Definition of ${}_t p_x$ in terms of probabilities of X, the random variable for age at death.

Survival Distributions

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$_t p_x = \Pr(X > x + t \mid X > x)$

Lesson 3, page 28, Table 3.1

Definition of $_{t|u}q_x$ in terms of probabilities of *X*, the random variable for age at death.

Survival Distributions

$_{t|u}q_x = \Pr(x + t < X \le x + t + u \mid X > x)$

Lesson 3, page 28, Table 3.1

General formula for A_x

Insurances

$$A_x = \sum_{k=0}^{\infty} v^{k+1} \,_k p_x \, q_{x+k}$$

Lesson 12, page 202, formula (12.1)

General formula for $\mathbf{E}[Z_x^2]$

Insurances

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$$\mathbf{E}[Z_x^2] = \sum_{k=0}^{\infty} {}_{k|} q_x v^{2(k+1)} = \sum_{k=0}^{\infty} {}_{k} p_x q_{x+k} v^{2(k+1)}$$

Lesson 12, page 202, formula (12.2)

General formula for $A^1_{x:n}$

Insurances

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$$A_{x:\overline{n}}^{1} = \sum_{k=0}^{n-1} v^{k+1} {}_{k} p_{x} q_{x+k}$$

Lesson 12

General formula for $A_{x:\overline{n}|}$

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Insurances

$$A_{x:\overline{n}} = \sum_{k=0}^{n-1} v^{k+1} {}_{k} p_{x} q_{x+k} + v^{n} {}_{n} p_{x}$$

Lesson 12

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General formula for $_{n|}A_{x}$

Insurances

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$${}_n|A_x = \sum_{k=n}^{\infty} v^{k+1} {}_k p_x q_{x+k}$$

Lesson 12

General formula for $_{n|}A_{x:\overline{m}|}^{1}$

Insurances

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$$_{n|A_{x:\overline{m}|}^{1}} = \sum_{k=n}^{n+m-1} v^{k+1} {}_{k} p_{x} q_{x+k}$$

Lesson 12

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Formula for EPV of benefit premium annuity-due

Retiree Health Benefits

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$$\ddot{a}_B(x,t) = \sum_{k=0}^{\infty} v^k {}_k p_x \left(\frac{B(x+k,t+k)}{B(x,t)} \right)$$

Lesson 72, page 1359, formula (72.1)

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Formula for EPV of benefit premium annuity-due when health costs by age increase geometrically with B(x + 1, t)/B(x, t) = c and health cost inflation is constant at rate j. **Retiree Health Benefits**

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$$\ddot{a}_B(x,t) = \sum_{k=0}^{\infty} v^k{}_k p_x c^k (1+j)^k$$

Lesson 72, page 1360, formula (72.2)

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When health costs by age increase geometrically with B(x + 1, t)/B(x, t) = c and health cost inflation is constant at rate j, benefit premium annuity-due can be valued at whole life annuity at adjusted interest rate i^* . What is i^* ? **Retiree Health Benefits**

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$$i^* = \frac{1+i}{c(1+j)} - 1$$

Lesson 72, page 1360

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