國立政治大學九十三學年度研究所博碩士班入學考試命題 第2-1頁

考試科目	保險法	所別	風管系(486)	考試時間	五月廿二日上午第一節 星期六

一、最高法院七十六年台上字第一一六六號判例：「複保險之成立，應以要保人與數保險人分別訂立之數保險契約同時並存為必要。若要保人先後與二以上之保險人訂立保險契約，先行訂立之保險契約，即非複保險，因其保險契約成立時，尚未呈複保險之狀態。要保人與他保險人訂立保險契約，故意不將先行所訂保險契約之事實通知後一保險契約之保險人，依保險法第三十七條規定，後一保險契約應屬無效，非謂成立在先之保險契約亦屬無效。」

前開判例與保險法有關複保險規定之意旨有何牴觸？對於財產保險及人身保險是否均應有其適用？

25%

二、最高法院八十六年台上字第二一二三號判例：「保險法第六十四條之規定，乃保險契約中關於因詐欺而為不實表示之特別規定，應排除民法第九十二條規定之適用。」

前開判例之法理依據為何？是否與保險契約為誠信善意契約之意旨相抵觸？是否過份偏惠要保人？

他國立法例中就此一問題如何處理？

25%

備考

試題隨卷繳交

國立政治大學九十三學年度研究所博碩士班入學考試命題 第 2-2 頁

考試科目：保險法
所別：風管所（481）
考試時間：5月22日 星期六 上午第一節

三、法國、日本、德國與美國保險契約法均影響我國保險法（契約法部份）之立法甚深。試以比較法研究之觀點，討論我國現行法（契約法部份）之一些重要問題，並提出具体的改善建議。50%

(481)

保險學試題

壹、名詞解釋（每題十分）

一、專屬保險(captive insurance)

二、核保 (underwriting)

三、危險因素 (hazard)

四、超額賠款再保險 (excess of loss reinsurance)

貳、申論題（每題三十分）

一、我國地理環境特殊，經常遭受颱風、地震、洪水等天然災害之侵襲，時而危及企業經營時之安全。然而當前國內與國際之保險與再保險市場承保能量有限，無法消納上述天然災害風險，尤以高科技產業為甚。高科技產業如何利用「新興風險移轉」(Alternative Risk Transfer)模式，有效分散天然災害風險？試申論之。

二、保險業資金來源為何？試說明之。各國保險法規多就保險業資金運用有所規範，其目的何在？試說明之。主管機關若對保險業資金運用未能有效監理，其可能產生之負面效果為何？試申論之。

1.

Please provide an explanation for " 養兒防老 ". (15%)

(Note: Since this is a test of microeconomics, you must explain the above questions by microeconomics theory to get scores.)

2.

(a) Give a brief definition of adverse selection. (5%)

(b) Give an example of adverse selection in the insurance market. (5%)

(c) Please use microeconomics theory to explain why adverse selection occurs in your above example. (15%)

(d) Provide solutions to cope with adverse selection in insurance market (note: I expect more than one solutions) . (10%)

(e) Please use microeconomics theory to explain why your above solutions work. (15%)

3.

Assume that an individual with initial wealth W faces a random loss L with probability π. The individual can pay insurance premium πQ to purchase insurance coverage Q. The government allows the individual to deduction the net loss by $(L-Q)t$. The utility of the individual is denoted by u where $u'>0$ and $u''<0$. The individual chooses the optimal insurance coverage to maximize his expected utility, and therefore the model can be expressed as

$$\underset{Q}{Max} \quad \pi u(W-(L-Q)(1-t)-\pi Q)+(1-\pi)u(W-\pi Q).$$

(a) Show that the optimal insurance coverage is L if the government allows no tax deduction on the net loss, i.e., $t=0$. (10%)

(b) Show that the optimal insurance coverage is less than L if the government allows tax deduction on the net loss, i.e., $t>0$. (10%)

(c) Show that the optimal insurance coverage decreases if t increases. (15%)

1. Find the moment-generating function of the random variable $Y = \frac{1}{4}(X-3)$, given the moment-generating function $M_X(t) = e^{3t+8t^2}$. Then use the found moment-generating function to determine the mean and variance of Y. (20%)

2. Suppose that the joint probability density of X and Y is $f(x,y) = \frac{1}{3}(x+y)$ for $0 < x < 1$, $0 < y < 2$ and $f(x,y) = 0$ elsewhere. What is the variance of Z = 4X + 6Y − 2. (16%)

3. Please show that the mean of a random sample of size n from an exponential population is a minimum variance unbiased estimator of the parameter θ. (15%)

4. Assume that $X_1, X_2, \ldots, X_n$ constitute a random sample of size n from a geometric population. Find the formulas for estimating the parameter θ using the method of moments and the method of maximum likelihood. (20%)

5. A single observation of a random variable with an exponential distribution is used to test the null hypothesis that the mean of the distribution is $\theta = 2$ against the alternative hypothesis $\theta = 5$. If the null hypothesis is accepted if and only if the observed value of the random variable is less than 4, find the probabilities of types I and types II errors. (14%)

6. Someone argues that the probable deviation of the total loss of the insurer from its expected value disappear as the size of the pool approaches infinity. In other words, large insurers are safer than small insurers. Is the statement true or false? (Hint: use the law of large numbers but be careful in distinguishing average loss from total loss) (15%)

You are required to write down your answers clearly.

1. (20%) Explain the meaning of the following:

   (a) Arbitrage, (5%)

   (b) Completeness, (5%)

   (c) Self-financing portfolios, (5%)

   (d) Delta hedging. (5%)

2. (15%) Compute the stochastic differential for Z when $Z(t) = \frac{1}{X(t)}$ and X has the stochastic differential

$$dX(t) = \alpha X(t)dt + \sigma X(t)dW(t).$$

2. (25%) Consider the standard Black-Scholes model. Please write down the pricing approach for the European call option.

3. (20%) Please write down the Itô's formula and compute $\int_0^t W(s)dW(s)$ where W is a Wiener process.

4. (20%) What is the meaning of the risk neutral valuation and the associated risk adjusted measure in pricing the contingent claim ?

考試科目	壽險數學	所別	風管精算組	考試時間	五月二十二日 星期六 下午

(483)

1. Consider a fully-discrete 3-year endowment insurance of 1 issued to (x). If $P_{x:\overline{3}|} = 0.3$, ${}_1V_{x:\overline{3}|} = 0.2$, and ${}_2V_{x:\overline{3}|} = 0.5$, determine $\mathrm{Var}({}_1L)$. (10%)

2. Find the actuarial present value, in terms of deferred single and joint life annuity symbols, of a continuous annuity of 1 per annum payable while at least one of two lives (40) and (55) is living and is over 60, but not if (40) is alive and under age 50. (10%)

3. A 2-year term insurance is issued to (x). Benefits are payable at the end of the year of death. The death benefit for policy year t is b_t, $b_t \geq 0$. Given that $i = 0$, $q_x = 0.1$, $q_{x+1} = 0.4$ and $b_1 + b_2 = 10$, find the value of b_1 which minimizes $\mathrm{Var}(Z)$. (10%)

4. You are given:
   (i) Mortality follows De Moivre's law with $\omega = 100$.
   (ii) $i = 0.05$
   (iii) The following annuity-certain values:

$$\bar{a}_{\overline{40}|} = 17.58$$

$$\bar{a}_{\overline{50}|} = 18.71$$

$$\bar{a}_{\overline{60}|} = 19.40$$

Calculate ${}_{10}\bar{V}(\bar{A}_{40})$ (10%)

5. For a 5-year deferred whole life annuity-due of 1 on (x), you are given: (10%)
   (a) $\mu(x+t) = 0.01,\ t \geq 0$
   (b) $i = 0.04$
   (c) $\ddot{a}_{x:\overline{5}|} = 4.542$
   (d) The random variable S denotes the sum of the annuity payments.

Calculate $pr[S > {}_{5|}\ddot{a}_x]$

6. For $0 \le t \le 1$, and the assumption of a uniform distribution of deaths in each year of age, express

$$_{t|}\ddot{a}_x$$

in terms of i, t and $\ddot{a}_x$. (10%)

7. Consider a situation with three causes of decrement: mortality, disability and withdrawal. Assume that mortality and disability are uniformly distributed (in each year of age) in the associated single decrement tables with absolute rates of $q_x'^{(1)}$ and $q_x'^{(2)}$, respectively. Furthermore, assume that (10%)

$$_t p_x'^{(3)} = 1 - \alpha t, \qquad 0 \le t < 1$$

and

$$p_x'^{(3)} = \beta < 1 - \alpha .$$

Evaluate $q_x^{(3)}$ in terms of $\alpha, \beta, q_x'^{(1)}$ and $q_x'^{(2)}$

8. A whole life insurance policy pays \$75,000 immediately on death to (45). Level premiums of P a year are payable continuously throughout the duration of the contract. $L(P)$ is the initial loss random variable. (10%)

Assume throughout a constant force of mortality of 2.5% a year, and a constant force of interest of 4% a year.

Calculate $\Pr(L(5{,}000) > 50{,}000)$.

9. An insurer issues a pure endowment insurance policy that will pay a sum insured of \$50,000 if (50) survives 10 years. The insurer's utility function of wealth is given by:

$$e(w) = -e^{-aw}$$ (10%)

where w is the insurer's current wealth, and $a = 4 \times 10^{-6}$.

Calculate the single benefit premium for this policy using the indifference principle, assuming a constant force of mortality of 0.015 a year and constant force of interest 0.04 a year.

10. Assuming that mortality conforms to de Moivre's law and that $\mu(80) = 0.15$, calculate the value of $_{20}p_{60}$. (10%)