# STAT 490
# Spring 2016
# Quiz 3
### April 12, 2016

1. Huining who is (50) purchases a Type B universal life policy with an additional death benefit of 100,000. The cost of insurance for Huining's policy is 90% of the mortality rates in the Illustrated Life Table. Additionally, you are given that:

| Policy Year | Annual Premium | Percent of Premium Charge | Annual Expense Charge | Annual Discount Rate for COI | Annual Credited Interest Rate |
|---|---|---|---|---|---|
| 1 | 5000 | 20% | 30 | 4% | 5% |

Calculate the account value at the end of one year.

**Solution:**

$$AV_1 = (AV_0 + P_1 - EC_1 - COI_1)(1 + i_1^c) =$$

$$\left(0 + 5000 - (30 + (0.2)(5000) - \left[(0.9)(0.00592)(1.04)^{-1}(100,000)\right]\right)(1.05) =$$

$$3630.58$$


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2. Wengyun who is also (50) purchases an identical Type A universal life policy with an total death benefit of 100,000. The cost of insurance for Wengyun's policy is also 90% of the mortality rates in the Illustrated Life Table. Additionally, you are given that:

| Policy Year | Annual Premium | Percent of Premium Charge | Annual Expense Charge | Annual Discount Rate for COI | Annual Credited Interest Rate |
|---|---|---|---|---|---|
| 1 | 5000 | 20% | 30 | 4% | 5% |

Calculate the account value at the end of one year.

**Solution:**

$$AV_1 = (AV_0 + P_1 - EC_1 - COI_1)(1 + i_1^c)$$

$$COI_1 = \frac{(0.9)(0.00592)(1.04)^{-1}\left[100,000 - \left(0 + 500 - (30 + (0.2)(5000))\right)(1.05)\right]}{1 - (0.9)(0.00592)(1.04)^{-1}(1.05)} = 493.61$$

$$AV_1 = \left(0 + 5000 - (30 + (0.2)(5000) - 493.61\right)(1.05) =$$

$$3650.21$$

3. The two policies have identical charges and premiums. However, the account value for Wengyun is larger than the account value for Huining. Explain why?

**Solution:**

Type B universal life provides a total death benefit equal to the Additional Death Benefit plus the account value at the end of the year. In this case that is 100,000 plus the account value.

Type A universal life provides a level total death benefit which means the Additional Death Benefit is the total death benefit less the account value at the end of the year. In this case, the total death benefit is 100,000 and the Additional Death Benefit is less than 100,000.

Since the cost of insurance is based on the Additional Death Benefit, the Type A cost of insurance will be less provided everything else is the same. This results in the Type A account value being higher.


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