FN241 Quiz 1 - Solutions

Provide precise and concise responses to the following questions referring to theories, concepts, and frameworks as discussed in the class materials and the main textbook. For quantitative problems, demonstrate the process of calculation and clearly highlight your answers as appropriate. Write down your answers clearly so that the lecturer can read them easily.

1. (3 points) Building in flood zones are difficult to insure by private insurers because the ideal requirements of an insurable risk are difficult to meet.
    a. Identify the ideal requirements of an insurable risk
    b. Which of the requirements of an insurable risk are not met by the flood peril?

    (a) Ideal requirements of an insurable risk:

    • Large number of exposure units

    • Accidental and unintentional loss

    • Determinable and measurable loss

    • No catastrophe loss

    • Calculable chance of loss

    • Economically feasible premium

    (b) The requirement of not having a catastrophe loss is not met because large numbers of exposure units in a flood zone would be incurring losses at the same time. Also, the requirement of an economically feasible premium generally is not met. Without a government backup, premiums for flood insurance in major flood zones generally would be unaffordable for many insureds.

2. (5 points) Great West States (GWS) is a railroad company operating in the Western United States. Juanita Salazar is risk manager of GWS. At the direction of the company's chief executive officer, she is searching for ways to handle the company's risks in a more economical way. Juanita was asked to determine whether the installation of a new sprinkler system at the corporate headquarters building would be justified. The cost of the project would be $40,000. She estimates the project would provide an after-tax net cash flow of $25,000 per year for three years, with the first of these cash flows coming one year after investment in the project.

    GWS is considering expanding its routes to include Colorado, New Mexico, Texas, and Oklahoma. The company is concerned about the number of derailments that might occur. Juanita ran a regression with "thousands of miles GWS locomotives traveled" as the independent variable and number of derailments" as the dependent variable. Results of the regression are as follows:

    $$Y = 2.31 + 0.022X$$

with the expansion, GWS trains will travel an estimated 640,000 miles next year.

a. What is the net present value (NPV) of the sprinkler system project, assuming the rate of return required by GWS investors is 10 percent?

b. How many derailments should Juanita expect next year, assuming the regression results are reliable and GWS goes ahead with the expansion plan?

a. The net present value (NPV) of an investment project is equal to the present value of the future cash flows less the cost of the project. Using 10 percent as the discount rate, the NPV of this project is $22,171.30 as shown below:

$$NPV = -\$40,000 + \frac{\$25,000}{(1+0.10)^1} + \frac{\$25,000}{(1+0.10)^2} + \frac{\$25,000}{(1+0.10)^3}$$
$$NPV = -\$40,000 + \$22,727.27 + \$20,661.16 + \$18,782.87$$
$$NPV = \$22,171.30$$

As the NPV is positive, the project is acceptable. The NPV could also have been calculated by treating the three $25,000 cash flows as an ordinary annuity.

b. As the independent variable is "thousands of miles traveled," the expected 640,000 miles is entered into the prediction as 640. Substituting this value into the regression equation yields an estimate of between 16 and 17 derailments, as shown below:

$$Y(\#\text{ of derailments}) = 2.31 + 0.22(640)$$
$$= 2.31 + 14.08$$
$$= 16.39$$

3. (3 points) Consider the following probability distribution of returns for Alpha Corporation:

Current Stock Price ($)	Stock Price in One Year ($)	Return *R*	Probability *PR*
	$35	40%	25%
$25	$25	0%	50%
	$20	-20%	25%

a. Calculate the expected return for Alpha Corporation
b. Calculate the standard deviation of the return on Alpha Corporation

a. $E[R] = \Sigma R\ P_R \times R = .25(40\%) + .50(0\%) + .25(-20\%) = 5\%$

b. $Var(R) = \Sigma R\ P_R \times (R - E[R])^2 = .25(.40 - .05)^2 + .50(.00 - .05)^2 + .25(-20 - .05)^2 = .0475$ or 4.75%

$SD(R) = \sqrt{\text{Var(R)}} = \sqrt{.0475} = .2179$ or 21.79%

4. (4 points) Consider the returns of stock X and Y from the following table:

Year End	Stock X Return	Stock Y Return
2011	20%	-10%
2012	75%	5%
2013	-25%	-60%
2014	50%	70%
2015	6%	15%
2016	15%	1%

a. Given that $\sum(R_X - E[R_X])^2 = 0.6098$, $\sum(R_Y - E[R_Y])^2 = 0.8778$, and $\sum(R_X - E[R_X])(R_Y - E[R_Y]) = 0.4787$, calculate the correlation between returns of stock X and Y

b. Your friend anticipates that stock X is Exxon Mobil and stock Y is Japan Airlines. Do you agree with him? Explain your answer.

a. $\rho_{XY} = \frac{\sigma_{XY}}{\sigma_X \sigma_Y} = \frac{\frac{0.4787}{T-1}}{\sqrt{\frac{0.6098}{T-1}}\sqrt{\frac{0.8778}{T-1}}} = 65.43\%$

b. Based on the calculated correlation of about 65%, the 2 stocks vary in the same direction. If they were Exxon Mobil and Japan Airlines, they should have varied in the opposite direction. A good year of an oil company (due to higher oil prices) may reflect to a bad year of an airline company (due to higher fuel expenses, thus lower profits).