

- Given the following 30 ordered simulated *percentage* returns of an asset, calculate the VAR and expected shortfall (*both expressed in terms of returns*) at a 90% confidence level.
 -16, -14, -10, -7, -7, -5, -4, -4, -4, -3, -1, -1, 0, 0, 0, 1, 2, 2, 4, 6, 7, 8, 9, 11, 12, 12, 14, 18, 21, 23
 - VAR (90%) = 10, Expected shortfall = 14
 - VAR (90%) = 10, Expected shortfall = 15
 - VaR (90%) = 14, Expected shortfall = 15
 - VaR (90%) = 18, Expected shortfall = 22
- Suppose X follows an AR(1) model : $X(t)=0.1+0.8 \cdot X(t-1)+e(t)$, where $E(e(t))=0$. What is the long term mean of X?
 - 0.1250
 - 0.5000
 - 2.0000
 - 0.0000
- The result of the linear regression is: $Y = 0.10 - 0.50 X$ with a correlation coefficient $R = (-0.90)$. The fraction of the variance of Y attributable to X is equal to:
 - (-0.90)
 - (+0.90)
 - (+0.81)
 - (-0.50)
- Which of the following statements is the most accurate about the relationship between a normal distribution and a Student's t-distribution that have the same mean and standard deviation?
 - They have the same skewness and the same kurtosis.
 - The Student's t-distribution has larger skewness and larger kurtosis.
 - The kurtosis of a Student's t -distribution converges to that of the normal distribution as the number of degrees of freedom increases.
 - The normal distribution is a good approximation for the Student's t-distribution when the number of degrees of freedom is small.
- Which one of the following statements about the normal distribution is NOT accurate?
 - Kurtosis equals 3.
 - Skewness equals 1.
 - The entire distribution can be characterized by two moments, mean and variance.
 - The normal density function has the following expression:

$$f(x) = \frac{1}{\sqrt{2\pi\sigma^2}} \exp\left[-\frac{1}{2\sigma^2}(x - \mu)^2\right]$$

6. A portfolio is composed of two securities and has the following characteristics

- Investment in security A = USD 1,500,000
- Investment in security B = USD 3,000,000
- Volatility of security A = 7%
- Volatility of security B = 3%
- Correlation between security A and B = 10%

What is the closest answer for the portfolio diversified VAR at 95% confident level?

- a. USD 7,351 b. USD 212,920
c. USD 365,715 d. USD 234,630
7. If a random variable X has density $f(x)$ and random variable Y has density $g(y)$, then X and Y are independent of each other if and only if their joint density function $h(x,y)$ satisfies,
- a. $h(x,y) = k f(x) g(y)$; $k \neq 1$ b. $h(x,y) > f(x) g(y)$
c. $h(x,y) = f(x) g(y)$ d. $h(x,y) < f(x) g(y)$
8. At the end of 2002, the annual marginal default rate was 2.3% for BBB-rated bonds. What is the survival rate for such bonds?
- a. 2.3% b.7.7% c.97.7% d. Insufficient data
9. A portfolio consists of 17 uncorrelated bonds, each rated B. The 1-year marginal default probability of each bond is 5.93%. Assuming an even spread of default probability over the year for each of the bonds, what is the probability of exactly 2 bonds defaulting in the first month?
- a. 0.0325% b.0.325% c.0.024% d.0.24%
10. A risk analyst performs a simple linear regression on return data comprising three variables evolving in time and obtains, amongst others, the following statistics; Based on these data at a 95% confidence level, the analyst should conclude that:

	Coefficients	Standard Error	t-statistic
Intercept	49.94	2.85	17.53
X Variable 1	-38.79	138.93	-0.28
X Variable 2	-431.75	170.50	-2.53
X Variable 3	-70.40	121.06	-0.58

- a. The intercept and "X Variable 2" are statistically significant
 b. "X Variable 1" and "X Variable 3" are statistically significant
 c. "X Variable 1", "X Variable 2" and "X Variable 3" are all statistically not significant
 d. More information is required, such as the corresponding p -values, before any meaningful deductions may be made.
11. A company has a constant 7% per year probability of default. What is the probability the company will be in default after three years?
 a. 7% b. 19.6% c. 21% d. 22.5%
12. If $Y = \ln(X)$ and Y is normally distributed with zero mean and 2.33 standard deviation. What is the expected value of X ?
 a. 15.10 b. 3.21 c. 227.90 d. 1
13. A sample has the following characteristics. Which is the standard error of the mean estimate?
- The mean of the sample is 2.5%
 - Standard deviation is 1.5%
 - 400 observations in the sample
- a. 0.125% b. 0.088% c. 0.053% d. 0.075%
14. There are 10 bonds in a credit default swap basket; the probability of default for each of the bonds is 5%. The probability of any one of the bond defaulting is completely independent of what happens to the other bonds in the basket. What is the probability exactly one bond default?
 a. 5% b. 50% c. 32% d. 3%
15. Let X and Y are two random variables representing the annual returns of two different portfolios. If $E(X) = 3$, $E(Y) = 4$ and $E(XY) = 11$, then what is $Cov(XY)$?
 a. -1 b. 0 c. 11 d. 12