Question #1 of 105

Question ID: 1456400

Compute the standard deviation of a two-stock portfolio if stock A (40% weight) has a variance of 0.0015, stock B (60% weight) has a variance of 0.0021, and the correlation coefficient for the two stocks is –0.35?

A) 1.39%.

B) 2.64%.

C) 0.07%.

Explanation

The standard deviation of the portfolio is found by:

$$[W_1^2\sigma_1^2 + W_2^2\sigma_2{}^2 + 2W_1W_2\sigma_1\sigma_2\rho_{1,2}]^{0.5}$$

$$= [(0.40)^2(0.0015) + (0.60)^2\ (0.0021) + (2)(0.40)(0.60)(0.0387)(0.0458)(-0.35)]^{0.5}$$

$$= 0.0264, \text{ or } 2.64\%.$$

(Module 3.3, LOS 3.k)

Question #2 of 105

Question ID: 1456418

John purchased 60% of the stocks in a portfolio, while Andrew purchased the other 40%. Half of John's stock-picks are considered good, while a fourth of Andrew's are considered to be good. If a randomly chosen stock is a good one, what is the probability John selected it?

A) 0.40.

B) 0.75.

C) 0.30.

Explanation

Using the information of the stock being good, the probability is updated to a conditional probability:

P(*John* | *good*) = P(*good and John*) / P(*good*).

P(*good and John*) = P(*good* | *John*) × P(*John*) = 0.5 × 0.6 = 0.3.

P(*good and Andrew*) = 0.25 × 0.40 = 0.10.

P(*good*) = P(*good and John*) + P (*good and Andrew*) = 0.40.

P(*John* | *good*) = P(*good and John*) / P(*good*) = 0.3 / 0.4 = 0.75.

(Module 3.3, LOS 3.m)

Question #3 of 105

Question ID: 1456423

A supervisor is evaluating ten subordinates for their annual performance reviews. According to a new corporate policy, for every ten employees, two must be evaluated as "exceeds expectations," seven as "meets expectations," and one as "does not meet expectations." How many different ways is it possible for the supervisor to assign these ratings?

A) 5,040.

B) 10,080.

C) 360.

Explanation

The number of different ways to assign these labels is:

$$\frac{10!}{2! \times 7! \times 1!} = \frac{3{,}628{,}800}{2 \times 5{,}040 \times 1} = 360$$

(Module 3.3, LOS 3.n)

Question #4 of 105

Question ID: 1456392

The covariance of the returns on investments X and Y is 18.17. The standard deviation of returns on X is 7%, and the standard deviation of returns on Y is 4%. What is the value of the correlation coefficient for returns on investments X and Y?

A) +0.32.

B) +0.65.

C) +0.85.

Explanation

The correlation coefficient = Cov (X,Y) / [(Std Dev. X)(Std. Dev. Y)] = 18.17 / 28 = 0.65

(Module 3.3, LOS 3.k)

Question #5 of 105

Question ID: 1456335

If the probability of an event is 0.20, what are the odds against the event occurring?

A) Five to one.

B) Four to one.

C) One to four.

Explanation

The answer can be determined by dividing the probability of the event by the probability that it will not occur: (1/5) / (4/5) = 1 to 4. The odds against the event occurring is four to one, i.e. in five occurrences of the event, it is expected that it will occur once and not occur four times.

(Module 3.1, LOS 3.c)

Question #6 of 105

Question ID: 1456372

The probability that interest rates will increase this year is 40%, and the probability that inflation will be over 2% is 30%. If inflation is over 2%, the probability of an increase in interest rates is 50%. The probability that inflation will be over 2% or interest rates increase this year is:

A) 20%.

B) 55%.

C) 70%.

Explanation

Prob(interest rates increase) + Prob(inflation is over 2%) − Prob(interest rates increase | inflation is over 2%) × Prob(inflation is over 2%) = 0.4 + 0.3 − 0.5 × 0.3 = 55%.

(Module 3.1, LOS 3.e)

Question #7 of 105

Question ID: 1456355

The following table summarizes the results of a poll taken of CEO's and analysts concerning the economic impact of a pending piece of legislation:

Group	Think it will have a positive impact	Think it will have a negative impact	Total
CEO's	40	30	70
Analysts	70	60	130
	110	90	200

What is the probability that a randomly selected individual from this group will be either an analyst or someone who thinks this legislation will have a positive impact on the economy?

A) 0.75.

B) 0.80.

C) 0.85.

Explanation

There are 130 total analysts and 40 CEOs who think it will have a positive impact. (130 + 40) / 200 = 0.85.

(Module 3.1, LOS 3.e)

Question #8 of 105

Question ID: 1456380

The events Y and Z are mutually exclusive and exhaustive: P(Y) = 0.4 and P(Z) = 0.6. If the probability of X given Y is 0.9, and the probability of X given Z is 0.1, what is the unconditional probability of X?

A) 0.33.

B) 0.40.

C) 0.42.

Explanation

Because the events are mutually exclusive and exhaustive, the unconditional probability is obtained by taking the sum of the two joint probabilities: P(X) = P(X | Y) × P(Y) + P(X | Z) × P(Z) = 0.4 × 0.9 + 0.6 × 0.1 = 0.42.

(Module 3.2, LOS 3.g)

Question #9 of 105

Question ID: 1456339

A recent study indicates that the probability that a company's earnings will exceed consensus expectations equals 50%. From this analysis, the odds that the company's earnings exceed expectations are:

A) 1 to 1.

B) 1 to 2.

C) 2 to 1.

Explanation

Odds for an event equals the ratio of the probability of success to the probability of failure. If the probability of success is 50%, then there are equal probabilities of success and failure, and the odds for success are 1 to 1.

(Module 3.1, LOS 3.c)

Question #10 of 105

Question ID: 1456405

Use the following probability distribution.

State of the Economy	Probability	Return on Portfolio
Boom	0.30	15%
Bust	0.70	3%

The expected return for the portfolio is:

A) 6.6%.

B) 8.1%.

C) 9.0%.

Explanation

The expected portfolio return is a probability-weighted average:

State of the Economy	Probability	Return on Portfolio	Probability × Return
Boom	0.30	15%	0.3 × 15% = 4.5%
Bust	0.70	3%	0.7 × 3% = 2.1%
Expected Return = ∑Probability × Return			**6.6%**

(Module 3.3, LOS 3.k)

Question #11 of 105

Question ID: 1456394

The returns on assets C and D are strongly correlated with a correlation coefficient of 0.80. The variance of returns on C is 0.0009, and the variance of returns on D is 0.0036. What is the covariance of returns on C and D?

A) 0.00144.

B) 0.03020.

C) 0.40110.

Explanation

$r = \text{Cov}(C,D) / (\sigma_C \times \sigma_D)$

$\sigma_C = (0.0009)^{0.5} = 0.03$

$\sigma_D = (0.0036)^{0.5} = 0.06$

$0.8(0.03)(0.06) = 0.00144$

(Module 3.3, LOS 3.k)

Question #12 of 105

Question ID: 1456338

Last year, the average salary increase for poultry research assistants was 2.5%. Of the 10,000 poultry research assistants, 2,000 received raises in excess of this amount. The odds that a randomly selected poultry research assistant received a salary increase in excess of 2.5% are:

A) 1 to 4.

B) 1 to 5.

C) 20%.

Explanation

For event "E," the probability stated as odds is: P(E) / [1 – P(E)]. Here, the probability that a poultry research assistant received a salary increase in excess of 2.5% = 2,000 / 10,000 = 0.20, or 1/5 and the odds are (1/5) / [1 – (1/5)] = 1/4, or 1 to 4.

(Module 3.1, LOS 3.c)

Question #13 of 105

Question ID: 1456348

A very large company has equal amounts of male and female employees. If a random sample of four employees is selected, what is the probability that all four employees selected are female?

A) 0.0256.

B) 0.1600.

C) 0.0625.

Explanation

Each employee has equal chance of being male or female. Hence, probability of selecting four female employees = $(0.5)^4$ = 0.0625

(Module 3.1, LOS 3.e)

Question #14 of 105

Question ID: 1456347

If two fair coins are flipped and two fair six-sided dice are rolled, all at the same time, what is the probability of ending up with two heads (on the coins) and two sixes (on the dice)?

A) 0.8333.

B) 0.0069.

C) 0.4167.

Explanation

For the four independent events defined here, the probability of the specified outcome is 0.5000 × 0.5000 × 0.1667 × 0.1667 = 0.0069.

(Module 3.1, LOS 3.e)

Question #15 of 105

Question ID: 1456337

If the probability of an event is 0.10, what are the odds for the event occurring?

A) Nine to one.

B) One to ten.

C) One to nine.

Explanation

The answer can be determined by dividing the probability of the event by the probability that it will not occur: (1/10) / (9/10) = 1 to 9. The probability of the event occurring is one to nine, i.e. in ten occurrences of the event, it is expected that it will occur once and not occur nine times.

(Module 3.1, LOS 3.c)

Question #16 of 105

Question ID: 1456341

A company has two machines that produce widgets. An older machine produces 16% defective widgets, while the new machine produces only 8% defective widgets. In addition, the new machine employs a superior production process such that it produces three times as many widgets as the older machine does. Given that a widget was produced by the new machine, what is the probability it is NOT defective?

A) 0.06.

B) 0.76.

C) 0.92.

Explanation

The problem is just asking for the conditional probability of a defective widget given that it was produced by the new machine. Since the widget was produced by the new machine and not selected from the output randomly (if randomly selected, you would not know which machine produced the widget), we know there is an 8% chance it is defective. Hence, the probability it is not defective is the complement, 1 – 8% = 92%.

(Module 3.1, LOS 3.d)

Question #17 of 105

Question ID: 1456385

There is a 60% chance that the economy will be good next year and a 40% chance that it will be bad. If the economy is good, there is a 70% chance that XYZ Incorporated will have EPS of $5.00 and a 30% chance that their earnings will be $3.50. If the economy is bad, there is an 80% chance that XYZ Incorporated will have EPS of $1.50 and a 20% chance that their earnings will be $1.00. What is the firm's expected EPS?

A) $2.75.

B) $3.29.

C) $5.95.

Explanation

State of the Economy (Unconditional Probability)	Conditional Probability	Joint Probability	EPS	Joint Probability × EPS
GOOD 60%	70%	60% × 70% = 42%	$5.00	42% × $5.00 = $2.10
	30%	60% × 30% = 18%	$3.50	18% × $3.50 = $0.63
BAD 40%	80%	40% × 80% = 32%	$1.50	32% × $1.50 = $0.48
	20%	40% × 20% = 8%	$1.00	8% × $1.00 = $0.08
Expected EPS = ∑ Joint Probability × EPS				**$3.29**

(Module 3.2, LOS 3.h)

Question #18 of 105

Question ID: 1456424

Which of the following statements about counting methods is *least* accurate?

A) The combination formula determines the number of different ways a group of objects can be drawn in a specific order from a larger sized group of objects.

B) The labeling formula determines the number of different ways to assign a given number of different labels to a set of objects.

C) The multiplication rule of counting is used to determine the number of different ways to choose one object from each of two or more groups.

Explanation

The permutation formula is used to find the number of possible ways to draw *r* objects from a set of *n* objects when the order in which the objects are drawn matters. The combination formula ("n choose r") is used to find the number of possible ways to draw *r* objects from a set of *n* objects when order is not important. The other statements are accurate.

(Module 3.3, LOS 3.n)

Question #19 of 105

Question ID: 1456343

Which probability rule determines the probability that two events will both occur?

A) The addition rule.

B) The multiplication rule.

C) The total probability rule.

Explanation

The multiplication rule is used to determine the joint probability of two events. The addition rule is used to determine the probability that at least one of two events will occur. The total probability rule is utilized when trying to determine the unconditional probability of an event.

(Module 3.1, LOS 3.e)

Question #20 of 105

Question ID: 1456408

If Stock X has a standard deviation of returns of 18.9% and Stock Y has a standard deviation of returns equal to 14.73% and returns on the stocks are perfectly positively correlated, the standard deviation of an equally weighted portfolio of the two is:

A) 10.25%.

B) 14.67%.

C) 16.82%.

Explanation

The standard deviation of two stocks that are perfectly positively correlated is the weighted average of the standard deviations: 0.5(18.9) + 0.5(14.73) = 16.82%. This relationship is true only when the correlation is one. Otherwise, you must use the formula:

$$\sigma_p = \sqrt{w_1^2\sigma_1^2 + w_2^2\sigma_2^2 + 2w_1w_2\sigma_1\sigma_2\rho_{1,2}}$$

(Module 3.3, LOS 3.k)

Question #21 of 105

Question ID: 1456375

If the outcome of event A is not affected by event B, then events A and B are said to be:

A) conditionally dependent.

B) mutually exclusive.

C) independent.

Explanation

If the outcome of one event does not influence the outcome of another, then the events are independent.

(Module 3.2, LOS 3.f)

Question #22 of 105

Question ID: 1456427

Marc Chausset, CFA, will be assigning ratings of either outperform, market perform, or underperform to the 12 stocks he follows. If he assigns each rating to the same number of stocks, the number of ways he can do this is *most appropriately* determined using:

A) factorials.

B) the combination formula.

C) the permutation formula.

Explanation

This particular counting problem is a labeling problem. There are 12! / (4! × 4! × 4!) = 34,650 ways to label four stocks *outperform*, four stocks *market perform*, and four stocks *underperform*. Neither the permutation formula nor the combination formula is appropriate for solving this counting problem.

(Module 3.3, LOS 3.n)

Question #23 of 105

Question ID: 1456399

For assets A and B we know the following: $E(R_A) = 0.10$, $E(R_B) = 0.20$, $Var(R_A) = 0.25$, $Var(R_B) = 0.36$ and the correlation of the returns is 0.6. What is the expected return of a portfolio that is equally invested in the two assets?

A) 0.2275.

B) 0.3050.

C) 0.1500.

Explanation

The expected return of a portfolio composed of n-assets is the weighted average of the expected returns of the assets in the portfolio: $((w_1) \times (E(R_1)) + ((w_2) \times (E(R_2)) = (0.5 \times 0.1) + (0.5 \times 0.2) = 0.15$.

(Module 3.3, LOS 3.k)

Question #24 of 105

Question ID: 1456363

Helen Pedersen has all her money invested in either of two mutual funds (Y and Z). She knows that there is a 40% probability that Fund Y will rise in price and a 60% probability that Fund Z will rise in price if Fund Y rises in price. What is the probability that both Fund Y and Fund Z will rise in price?

A) 0.24.

B) 1.00.

C) 0.40.

Explanation

Here we are calculating a joint probability. We know there is a 40% chance that Y rises and a 60% chance the Z rises if Y also rises (conditional probability). To find the probability that both rise, we simply multiply these probabilities together.

$P(Y) = 0.40$, $P(Z|Y) = 0.60$. Therefore, $P(YZ) = P(Y)P(Z|Y) = 0.40(0.60) = 0.24$.

(Module 3.1, LOS 3.e)

Question #25 of 105

Question ID: 1456379

Firm A can fall short, meet, or exceed its earnings forecast. Each of these events is equally likely. Whether firm A increases its dividend will depend upon these outcomes. Respectively, the probabilities of a dividend increase conditional on the firm falling short, meeting or exceeding the forecast are 20%, 30%, and 50%. The unconditional probability of a dividend increase is:

A) 0.500. ✗

B) 0.333. ✓

C) 1.000. ✗

Explanation

The unconditional probability is the weighted average of the conditional probabilities where the weights are the probabilities of the conditions. In this problem the three conditions fall short, meet, or exceed its earnings forecast are all equally likely. Therefore, the unconditional probability is the simple average of the three conditional probabilities: $(0.2 + 0.3 + 0.5) \div 3$.

(Module 3.2, LOS 3.g)

Question #26 of 105

Question ID: 1456324

Which of the following statements about probability is *most* accurate?

A) An outcome is the calculated probability of an event. ✗

B) A conditional probability is the probability that two or more events will happen concurrently. ✗

C) An event is a set of one or more possible values of a random variable. ✓

Explanation

Conditional probability is the probability of one event happening given that another event has happened. An outcome is the numerical result associated with a random variable.

(Module 3.1, LOS 3.a)

Question #27 of 105

Question ID: 1456412

The joint probability function for returns on an equity index (RI) and returns on a stock (RS)is given in the following table:

	Returns on Index (R_I)		
Return on stock (R_S)	**R_I = 0.16**	**R_I = 0.02**	**R_I = −0.10**
R_S = 0.24	0.25	0.00	0.00
R_S = 0.03	0.00	0.45	0.00
R_S = −0.15	0.00	0.00	0.30

Covariance between stock returns and index returns is *closest* to:

A) 0.014.

B) 0.019.

C) 0.029.

Explanation

$$E(I) = (0.25 \times 0.16) + (0.45 \times 0.02) + (0.30 \times -0.10) = 0.0190.$$

$$E(S) = (0.25 \times 0.24) + (0.45 \times 0.03) + (0.30 \times -0.15) = 0.0285.$$

Covariance = $[0.25 \times (0.16 - 0.0190) \times (0.24 - 0.0285)] + [0.45 \times (0.02 - 0.0190) \times (0.03 - 0.0285)] + [0.30 \times (-0.10 - 0.0190) \times (-0.15 - 0.0285)] = 0.0138$.

(Module 3.3, LOS 3.l)

Question #28 of 105

Question ID: 1456365

In a given portfolio, half of the stocks have a beta greater than one. Of those with a beta greater than one, a third are in a computer-related business. What is the probability of a randomly drawn stock from the portfolio having both a beta greater than one and being in a computer-related business?

A) 0.667.

B) 0.333.

C) 0.167.

Explanation

This is a joint probability. From the information: P(*beta* > 1) = 0.500 and P(*comp. stock* | *beta* > 1) = 0.333. Thus, the joint probability is the product of these two probabilities: (0.500) × (0.333) = 0.167.

(Module 3.1, LOS 3.e)

Question #29 of 105

Question ID: 1456331

Each lottery ticket discloses the odds of winning. These odds are based on:

A) past lottery history.

B) the best estimate of the Department of Gaming.

C) a priori probability.

Explanation

An a priori probability is based on formal reasoning rather than on historical results or subjective opinion.

(Module 3.1, LOS 3.b)

Question #30 of 105

Question ID: 1456395

An investor has two stocks, Stock R and Stock S in her portfolio. Given the following information on the two stocks, the portfolio's standard deviation is *closest* to:

- σ_R = 34%
- σ_S = 16%
- $r_{R,S}$ = 0.67
- W_R = 80%
- W_S = 20%

A) 29.4%.

B) 8.7%.

C) 7.8%.

Explanation

The formula for the standard deviation of a 2-stock portfolio is:

$s = [W_A^2 s_A^2 + W_B^2 s_B^2 + 2W_A W_B s_A s_B r_{A,B}]^{1/2}$

$s = [(0.8^2 \times 0.34^2) + (0.2^2 \times 0.16^2) + (2 \times 0.8 \times 0.2 \times 0.34 \times 0.16 \times 0.67)]^{1/2} = [0.073984 + 0.001024 + 0.0116634]^{1/2} = 0.0866714^{1/2} = 0.2944$, or approximately **29.4%.**

(Module 3.3, LOS 3.k)

Question #31 of 105

Question ID: 1456407

The following table shows the weightings and expected returns for a portfolio of three stocks:

Stock	Weight	$E(R_X)$
V	0.40	12%
M	0.35	8%
S	0.25	5%

What is the expected return of this portfolio?

A) 9.05%.

B) 8.33%.

C) 8.85%.

Explanation

The expected return is simply a weighted average return.

Multiplying the weight of each asset by its expected return, then summing, produces: E(RP) = 0.40(12) + 0.35(8) + 0.25(5) = 8.85%.

State of the Economy	Weight	$E(R_X)$	Probability × Return
V	0.40	12%	0.4 × 12%
M	0.35	8%	0.35 × 8%
S	0.25	5%	0.25 × 5%
Expected Return = ∑ Weight × $E(R_X)$			**8.85%**

(Module 3.3, LOS 3.k)

Question #32 of 105

Question ID: 1456357

The following table summarizes the availability of trucks with air bags and bucket seats at a dealership.

	Bucket Seats	No Bucket Seats	Total
Air Bags	75	50	125
No Air Bags	35	60	95
Total	110	110	220

What is the probability of selecting a truck at random that has either air bags or bucket seats?

A) 34%.

B) 73%.

C) 107%.

Explanation

The addition rule for probabilities is used to determine the probability of at least one event among two or more events occurring. The probability of each event is added and the joint probability (if the events are not mutually exclusive) is subtracted to arrive at the solution. P(air bags or bucket seats) = P(air bags) + P(bucket seats) – P(air bags and bucket seats) = (125 / 220) + (110 / 220) – (75 / 220) = 0.57 + 0.50 – 0.34 = 0.73 or 73%.

Alternative: 1 – P(no airbag and no bucket seats) = 1 – (60 / 220) = 72.7%

(Module 3.1, LOS 3.e)

Question #33 of 105

Question ID: 1456388

A conditional expectation involves:

A) refining a forecast because of the occurrence of some other event.

B) determining the expected joint probability.

C) calculating the conditional variance.

Explanation

Conditional expected values are contingent upon the occurrence of some other event. The expectation changes as new information is revealed.

(Module 3.2, LOS 3.i)

Question #34 of 105

Question ID: 1456352

There is a 50% probability that the Fed will cut interest rates tomorrow. On any given day, there is a 67% probability the DJIA will increase. On days the Fed cuts interest rates, the probability the DJIA will go up is 90%. What is the probability that tomorrow the Fed will cut interest rates or the DJIA will go up?

A) 0.72.

B) 0.95.

C) 0.33.

Explanation

This requires the addition formula. From the information: P(cut interest rates) = 0.50 and P(DJIA increase) = 0.67, P(DJIA increase | cut interest rates) = 0.90. The joint probability is 0.50 × 0.90 = 0.45. Thus P (cut interest rates or DJIA increase) = 0.50 + 0.67 – 0.45 = 0.72.

(Module 3.1, LOS 3.e)

Question #35 of 105

Question ID: 1456390

Tina O'Fahey, CFA, believes a stock's price in the next quarter depends on two factors: the direction of the overall market and whether the company's next earnings report is good or poor. The possible outcomes and some probabilities are illustrated in the tree diagram shown below:

Based on this tree diagram, the expected value of the stock if the market decreases is *closest* to:

A) $62.50.

B) $26.00.

C) $57.00.

Explanation

The expected value if the overall market decreases is 0.4($60) + (1 – 0.4)($55) = $57.

(Module 3.2, LOS 3.j)

Question #36 of 105

Question ID: 1456386

A two-sided but very thick coin is expected to land on its edge twice out of every 100 flips. And the probability of face up (heads) and the probability of face down (tails) are equal. When the coin is flipped, the prize is $1 for heads, $2 for tails, and $50 when the coin lands on its edge. What is the expected value of the prize on a single coin toss?

A) $2.47.

B) $17.67.

C) $1.50.

Explanation

We need to calculate of probability weighted average payoff.

Since the probability of the coin landing on its edge is 0.02, the probability of each of the other two events is 0.49. The expected payoff is: (0.02 × $50) + (0.49 × $1) + (0.49 × $2) = $2.47.

Outcome	Probability	Payoff	Probability × Payoff
Edge	2 / 100 = 2%	$50	2% × $50
Heads	49%	$1	49% × $1
Tails	49%	$2	49% × $2
Expected Payoff = ∑ Probability × Payoff			**$2.47**

(Module 3.2, LOS 3.h)

Question #37 of 105

Question ID: 1456382

Tully Advisers, Inc., has determined four possible economic scenarios and has projected the portfolio returns for two portfolios for their client under each scenario. Tully's economist has estimated the probability of each scenario as shown in the table below. Given this information, what is the expected return on Portfolio A?

Scenario	Probability	Return on Portfolio A	Return on Portfolio B
A	15%	17%	19%
B	20%	14%	18%
C	25%	12%	10%
D	40%	8%	9%

A) 12.55%.

B) 11.55%.

C) 12.75%.

Explanation

The expected return on Portfolio A is a probability-weighted average of 17%, 14%, 12%, and 8%.

Expected return = (0.15)(0.17) + (0.20)(0.14) + (0.25)(0.12) + (0.40)(0.08) = 0.1155 or 11.55%.

Scenario	Probability	Return on Portfolio A	Portfolio × Weight
A	15%	17%	15 × 17%
B	20%	14%	20% × 14%
C	25%	12%	25% × 12%
D	40%	8%	40% × 8%
Probability Weighted Average Return **∑ Probability × Weight**			**11.55%**

(Module 3.2, LOS 3.h)

Question #38 of 105

Question ID: 1456350

The probabilities that the prices of shares of Alpha Publishing and Omega Software will fall below $35 in the next six months are 65% and 47%. If these probabilities are independent, the probability that the shares of at least one of the companies will fall below $35 in the next six months is:

A) 0.31.

B) 0.81.

C) 1.00.

Explanation

We calculate the probability that at least one of the options will fall below $35 using the addition rule for probabilities (A represents Alpha, O represents Omega):

P(A or O) = P(A) + P(O) – P(A and O), where P(A and O) = P(A) × P(O)

P(A or O) = 0.65 + 0.47 – (0.65 × 0.47) = approximately 0.81

(Module 3.1, LOS 3.e)

Question #39 of 105

Question ID: 1470879

Given the following probability distribution, find the covariance of the expected returns for stocks A and B.

Event	$P(R_i)$	R_A	R_B
Recession	0.10	-5%	4%
Below Average	0.30	-2%	8%
Normal	0.50	10%	10%
Boom	0.10	31%	12%

A) 3.2.

B) 17.4.

C) 10.9

Explanation

Find the weighted average return for each stock.

Stock A: (0.10)(-5) + (0.30)(-2) + (0.50)(10) + (0.10)(0.31) = 7%.

Stock B: (0.10)(4) + (0.30)(8) + (0.50)(10) + (0.10)(0.12) = 9%.

Next, multiply the differences of the two stocks by each other, multiply by the probability of the event occurring, and sum. This is the covariance between the returns of the two stocks.

[(–5 – 7) × (4 – 9)] (0.1) + [(–2 – 7) × (8 – 9)](0.3) + [(10 – 7) × (10 – 9)](0.5) + [(31 – 7) × (12 – 9)](0.1) = 6.0 + 2.7 + 1.5 + 7.2 = 17.4

(Module 3.3, LOS 3.l)

Question #40 of 105

Question ID: 1456419

An analyst expects that 20% of all publicly traded companies will experience a decline in earnings next year. The analyst has developed a ratio to help forecast this decline. If the company has a decline in earnings, there is a 90% probability that this ratio will be negative. If the company does not have a decline in earnings, there is only a 10% probability that the ratio will be negative. The analyst randomly selects a company with a negative ratio. Based on Bayes' theorem, the updated probability that the company will experience a decline is:

A) 18%.

B) 26%.

C) 69%.

Explanation

Given a set of prior probabilities for an event of interest, Bayes' formula is used to update the probability of the event, in this case that the company we have already selected will experience a decline in earnings next year. Bayes' formula says to divide the Probability of New Information given Event by the Unconditional Probability of New Information and multiply that result by the Prior Probability of the Event. In this case, P(company having a decline in earnings next year) = 0.20 is divided by 0.26 (which is the Unconditional Probability that a company having an earnings decline will have a negative ratio (90% have negative ratios of the 20% which have earnings declines) plus (10% have negative ratios of the 80% which do not have earnings declines) or ((0.90) × (0.20)) + ((0.10) × (0.80)) = 0.26.) This result is then multiplied by the Prior Probability of the ratio being negative, 0.90. The result is (0.20 / 0.26) × (0.90) = 0.69 or 69%.

(Module 3.3, LOS 3.m)

Question #41 of 105

Question ID: 1456383

An investor is considering purchasing ACQ. There is a 30% probability that ACQ will be acquired in the next two months. If ACQ is acquired, there is a 40% probability of earning a 30% return on the investment and a 60% probability of earning 25%. If ACQ is not acquired, the expected return is 12%. What is the expected return on this investment?

A) 16.5%.

B) 12.3%.

C) 18.3%.

Explanation

E(r) = (0.70 × 0.12) + (0.30 × 0.40 × 0.30) + (0.30 × 0.60 × 0.25) = 0.165.

(Module 3.2, LOS 3.h)

Question #42 of 105

Question ID: 1456345

A bond portfolio consists of four BB-rated bonds. Each has a probability of default of 24% and these probabilities are independent. What are the probabilities of all the bonds defaulting and the probability of all the bonds not defaulting, respectively?

A) 0.00332; 0.33360.

B) 0.04000; 0.96000.

C) 0.96000; 0.04000.

Explanation

For the four independent events where the probability is the same for each, the probability of all defaulting is $(0.24)^4$. The probability of all not defaulting is $(1 – 0.24)^4$.

(Module 3.1, LOS 3.e)

Question #43 of 105

Question ID: 1456422

A firm wants to select a team of five from a group of ten employees. How many ways can the firm compose the team of five?

A) 25.

B) 120.

C) 252.

Explanation

This is a labeling problem where there are only two labels: chosen and not chosen. Thus, the combination formula applies: 10! / (5! × 5!) = 3,628,800 / (120 × 120) = 252.

With a TI calculator: 10 [2nd][nCr] 5 = 252.

(Module 3.3, LOS 3.n)

Question #44 of 105

Question ID: 1456326

The probability that tomorrow's high temperature will be below 32 degrees F is 20%. The probability that tomorrow's high temperature will be above 40 degrees F is 10%. These two events are:

A) independent.

B) exhaustive.

C) mutually exclusive.

Explanation

If two events cannot occur simultaneously, the events are mutually exclusive. The high temperature tomorrow cannot be *both* below 32 and above 40.

If two events are independent, the occurrence of one event does not affect the probability of occurrence of the other. Because these events are mutually exclusive, they cannot be independent; if one of them occurs, the probability of the other is zero.

For two events to be exhaustive, they must encompass the entire range of possible outcomes (that is, their probabilities sum to 100%). Here this is not the case as there are possible outcomes where the high temperature is between 32 and 40.

(Module 3.1, LOS 3.b)

Question #45 of 105

Question ID: 1456332

Which of the following is an *a priori* probability?

A) An analyst’s estimate of the probability the central bank will decrease interest rates this month. ✗

B) On a random draw, the probability of choosing a stock of a particular industry from the S&P 500. ✓

C) For a stock, based on prior patterns of up and down days, the probability of having a down day tomorrow. ✗

Explanation

A *priori* probability is based on formal reasoning. It refers to a probability that can be calculated in advance based on the nature of the possible outcomes. An *a priori* probability does not require a history of past outcomes.

In this example, there are 500 stocks in the S&P 500 (finite outcome). Each has an equal chance of being selected. The *a priori* probability of selecting an airline stock would be the number of airline stocks in the index divided by 500.

The probability of the stock having a down day tomorrow based on prior patterns is an example of an empirical probability, which is a probability based on observed or historical data.

An analyst's estimate of the probability that the central bank will decrease interest rates is best characterized as a subjective probability. This is based on an individual's judgement or opinion as to the occurrence of an event.

(Module 3.1, LOS 3.b)

Question #46 of 105

Question ID: 1456426

A firm is going to divide 12 employees into three teams of four. How many ways can the 12 employees be selected for the three teams?

A) 144.

B) 34,650.

C) 3,326,400.

Explanation

This problem is a labeling problem where the 12 employees will be assigned one of three labels (groups). Each group will have four employees. This requires the labeling formula.

Number of ways = N! / (N_1! + N_2! + N_3!)

There are [(12!) / (4! × 4! × 4!)] = 34,650 ways to group the employees.

(Module 3.3, LOS 3.n)

Question #47 of 105

Question ID: 1456333

Let A and B be two mutually exclusive events with P(A) = 0.40 and P(B) = 0.20. Therefore:

A) P(A and B) = 0.

B) P(A and B) = 0.08.

C) P(B|A) = 0.20.

Explanation

If the two evens are mutually exclusive, the probability of both occurring is zero.

(Module 3.1, LOS 3.b)

Question #48 of 105

Question ID: 1456374

The probability of rolling a 3 on the fourth roll of a fair 6-sided die:

A) depends on the results of the three previous rolls.

B) is 1/6 to the fourth power.

C) is equal to the probability of rolling a 3 on the first roll.

Explanation

Because each event is independent, the probability does not change for each roll. For a six-sided die the probability of rolling a 3 (or any other number from 1 to 6) on a single roll is 1/6.

(Module 3.2, LOS 3.f)

Question #49 of 105

Question ID: 1456398

The following information is available concerning expected return and standard deviation of Pluto and Neptune Corporations:

	Expected Return	Standard Deviation
Pluto Corporation	11%	0.22
Neptune Corporation	9%	0.13

If the correlation between Pluto and Neptune is 0.25, determine the expected return and standard deviation of a portfolio that consists of 65% Pluto Corporation stock and 35% Neptune Corporation stock.

A) 10.0% expected return and 16.05% standard deviation.

B) 10.3% expected return and 16.05% standard deviation.

C) 10.3% expected return and 2.58% standard deviation.

Explanation

ER_{Port} = $(W_{Pluto})(ER_{Pluto}) + (W_{Neptune})(ER_{Neptune})$

$= (0.65)(0.11) + (0.35)(0.09) = 10.3\%$

σ_p $= [(w_1)^2(\sigma_1)^2 + (w_2)^2(\sigma_2)^2 + 2w_1w_2\sigma_1\sigma_2\, r_{1,2}]^{1/2}$

$= [(0.65)^2(22)^2 + (0.35)^2(13)^2 + 2(0.65)(0.35)(22)(13)(0.25)]^{1/2}$

$= [(0.4225)(484) + (0.1225)(169) + 2(0.65)(0.35)(22)(13)(0.25)]^{1/2}$

$= (257.725)^{1/2} = 16.0538\%$

(Module 3.3, LOS 3.k)

Question #50 of 105

Question ID: 1377126

An investment manager has a pool of five security analysts he can choose from to cover three different industries. In how many different ways can the manager assign one analyst to each industry?

A) 10.

B) 60.

C) 125.

Explanation

We can view this problem as the number of ways to choose three analysts from five analysts when the order they are chosen matters. The formula for the number of permutations is:

$$\frac{n!}{(n-r)!} = \frac{5!}{2!} = 5 \times 4 \times 3 = 60$$

On the TI financial calculator: 5 2^{nd} nPr 3 = 60.

Alternatively, there are 5 2^{nd} nCr 3 = 10 ways to select three of the five analysts, and for each group of selected analysts, there are 3! = 3 × 2 × 1 = 6 ways to assign them the three industries. Therefore, there are 10 × 6 = 60 ways to assign the industries to the analysts.

Question #51 of 105

Question ID: 1456336

The probabilities of earning a specified return from a portfolio are shown below:

Probability	Return
0.20	10%
0.20	20%
0.20	22%
0.20	15%
0.20	25%

What are the odds of earning at least 20%?

A) Three to five.

B) Three to two.

C) Two to three.

Explanation

Odds are the number of successful possibilities to the number of unsuccessful possibilities:

P(E)/[1 – P(E)] or 0.6 / 0.4 or 3/2.

(Module 3.1, LOS 3.c)

Question #52 of 105

Question ID: 1456391

The covariance of returns on two investments over a 10-year period is 0.009. If the variance of returns for investment A is 0.020 and the variance of returns for investment B is 0.033, what is the correlation coefficient for the returns?

A) 0.687.

B) 0.350.

C) 0.444.

Explanation

The correlation coefficient is: Cov(A,B) / [(Std Dev A)(Std Dev B)] = 0.009 / [(√0.02)(√0.033)] = 0.350.

(Module 3.3, LOS 3.k)

Question #53 of 105

Question ID: 1456415

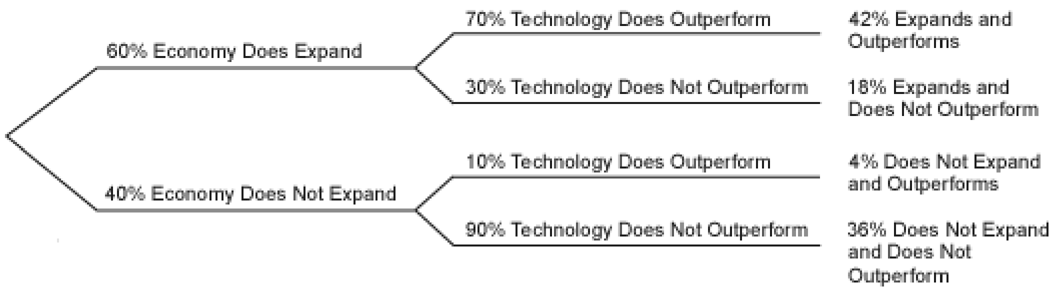
An economist estimates a 60% probability that the economy will expand next year. The technology sector has a 70% probability of outperforming the market if the economy expands and a 10% probability of outperforming the market if the economy does not expand. Given the new information that the technology sector will not outperform the market, the probability that the economy will not expand is *closest* to:

A) 67%.

B) 33%.

C) 54%.

Explanation



Using the new information we can use Bayes' formula to update the probability.

P(economy does not expand | tech does not outperform) = P(economy does not expand and tech does not outperform) / P(tech does not outperform).

P(economy does not expand and tech does not outperform) = P(tech does not outperform | economy does not expand) × P(economy does not expand) = 0.90 × 0.40 = 0.36.

P(economy does expand and tech does not outperform) = P(tech does not outperform | economy does expand) × P(economy does expand) = 0.30 × 0.60 = 0.18.

P(economy does not expand) = 1.00 – P(economy does expand) = 1.00 – 0.60 = 0.40.

P(tech does not outperform | economy does not expand) = 1.00 – P(tech does outperform | economy does not expand) = 1.00 – 0.10 = 0.90.

P(tech does not outperform) = P(tech does not outperform and economy does not expand) + P(tech does not outperform and economy does expand) = 0.36 + 0.18 = 0.54.

P(economy does not expand | tech does not outperform) = P(economy does not expand and tech does not outperform) / P(tech does not outperform) = 0.36 / 0.54 = 0.67.

(Module 3.3, LOS 3.m)

Question #54 of 105

Question ID: 1456358

Thomas Baynes has applied to both Harvard and Yale. Baynes has determined that the probability of getting into Harvard is 25% and the probability of getting into Yale (his father's alma mater) is 42%. Baynes has also determined that the probability of being accepted at both schools is 2.8%. What is the probability of Baynes being accepted at either Harvard or Yale?

A) 10.5%.

B) 64.2%.

C) 7.7%.

Explanation

Using the addition rule, the probability of being accepted at Harvard or Yale is equal to: P(Harvard) + P(Yale) – P(Harvard and Yale) = 0.25 + 0.42 – 0.028 = 0.642 or 64.2%.

(Module 3.1, LOS 3.e)

Question #55 of 105

Question ID: 1456397

Assume two stocks are perfectly negatively correlated. Stock A has a standard deviation of 10.2% and stock B has a standard deviation of 13.9%. What is the standard deviation of the portfolio if 75% is invested in A and 25% in B?

A) 0.00%.

B) 0.17%.

C) 4.18%.

Explanation

The standard deviation of the portfolio is found by:

$[W_1^2\,\sigma_1^2 + W_2^2\,\sigma_2^2 + 2W_1W_2\sigma_1\sigma_2r_{1,2}]^{0.5}$, or $[(0.75)^2(0.102)^2 + (0.25)^2(0.139)^2 + (2)(0.75)(0.25)(0.102)(0.139)(-1.0)]^{0.5} = 0.0418$, or 4.18%.

(Module 3.3, LOS 3.k)

Question #56 of 105

Question ID: 1456361

If the probability of both a new Wal-Mart and a new Wendy's being built next month is 68% and the probability of a new Wal-Mart being built is 85%, what is the probability of a new Wendy's being built if a new Wal-Mart is built?

A) 0.60.

B) 0.70.

C) 0.80.

Explanation

P(AB) = P(A|B) × P(B)

0.68 / 0.85 = 0.80

(Module 3.1, LOS 3.e)

Question #57 of 105

Question ID: 1456403

Tully Advisers, Inc., has determined four possible economic scenarios and has projected the portfolio returns for two portfolios for their client under each scenario. Tully's economist has estimated the probability of each scenario, as shown in the table below. Given this information, what is the standard deviation of returns on portfolio A?

Scenario	Probability	Return on Portfolio A	Return on Portfolio B
A	15%	18%	19%
B	20%	17%	18%
C	25%	11%	10%
D	40%	7%	9%

A) 5.992%.

B) 1.140%.

C) 4.53%.

Explanation

$E(R_A) = 11.65\%$

$\sigma^2 = 0.0020506 = 0.15(0.18 - 0.1165)^2 + 0.2(0.17 - 0.1165)^2 + 0.25(0.11 - 0.1165)^2 + 0.4(0.07 - 0.1165)^2$

$\sigma = 0.0452836$

(Module 3.3, LOS 3.k)

Question #58 of 105

Question ID: 1456366

A firm holds two $50 million bonds with call dates this week.

- The probability that Bond A will be called is 0.80.
- The probability that Bond B will be called is 0.30.

The probability that at least one of the bonds will be called is *closest to*:

A) 0.24.

B) 0.50.

C) 0.86.

Explanation

We calculate the probability that at least one of the bonds will be called using the addition rule for probabilities:

P(A or B) = P(A) + P(B) – P(A and B), where P(A and B) = P(A) × P(B)

P(A or B) = 0.80 + 0.30 – (0.8 × 0.3) = 0.86

(Module 3.1, LOS 3.e)

Question #59 of 105

Question ID: 1456402

Given the following probability distribution, find the standard deviation of expected returns.

Event	$P(R_A)$	R_A
Recession	0.10	-5%
Below Average	0.30	-2%
Normal	0.50	10%
Boom	0.10	31%

A) 7.00%.

B) 10.04%.

C) 12.45%.

Explanation

Find the weighted average return (0.10)(–5) + (0.30)(–2) + (0.50)(10) + (0.10)(31) = 7%.

Next, take differences, square them, multiply by the probability of the event and add them up. That is the variance. Take the square root of the variance for Std. Dev. $(0.1)(-5 - 7)^2 + (0.3)(-2 - 7)^2 + (0.5)(10 - 7)^2 + (0.1)(31 - 7)^2 = 100.8$ = variance.

$100.8^{0.5} = 10.04\%$.

(Module 3.3, LOS 3.k)

Question #60 of 105

Question ID: 1456330

Which of the following statements about the defining properties of probability is *least* accurate?

A) The probability of an event may be equal to zero or equal to one.

B) To state a probability, a set of mutually exclusive and exhaustive events must be defined.

C) The sum of the probabilities of events equals one if the events are mutually exclusive and exhaustive.

Explanation

Stating a probability does not require defining a mutually exclusive and exhaustive set of events. The two defining properties of probability are that the probability of an event is greater than or equal to zero and less than or equal to one, and if a set of events is mutually exclusive and exhaustive, their probabilities sum to one.

(Module 3.1, LOS 3.b)

Question #61 of 105

Question ID: 1456360

Pat Binder, CFA, is examining the effect of an inverted yield curve on the stock market. She determines that in the past century, when the yield curve has inverted, a bear market ensued 75% of the time. Binder believes the probability of an inverted yield curve in the next year is 20%. The probability that there will be an inverted yield curve next year followed by a bear market is *closest to:*

A) 20%. ✗

B) 75%. ✗

C) 15%. ✓

Explanation

This is a joint probability. From the information: P(Bear Market given inverted yield curve) = 0.75 and P(inverted yield curve) = 0.20. The joint probability is the product of these two probabilities: (0.75)(0.20) = 0.15.

(Module 3.1, LOS 3.e)

Question #62 of 105

Question ID: 1456329

An empirical probability is one that is:

A) derived from analyzing past data. ✓

B) supported by formal reasoning. ✗

C) determined by mathematical principles. ✗

Explanation

An empirical probability is one that is derived from analyzing past data. For example, a basketball player has scored at least 22 points in each of the season's 18 games. Therefore, there is a high probability that he will score 22 points in tonight's game.

(Module 3.1, LOS 3.b)

Question #63 of 105

Question ID: 1456367

A parking lot has 100 red and blue cars in it.

- 40% of the cars are red.
- 70% of the red cars have radios.
- 80% of the blue cars have radios.

What is the probability of selecting a car at random and having it be red and have a radio?

A) 28%.

B) 48%.

C) 25%.

Explanation

Here we are calculating a joint probability. In this case, it's that a car selected is red *and* has a radio. We need to multiply the unconditional probability of selecting a red car by the conditional probability of selecting a car with a radio *given* that it is a red car:

P(red and radio) = (P(red)) × (P(radio/red)) = (0.4) × (0.7) = 0.28 or 28%.

	Unconditional Probability (A)	**Conditional Probability (B)**	**Joint Probability A × B**
Red	40%	Radio 70%	**28% (Red + Radio)**
		No Radio 30%	12%(Red + NO Radio)
Blue	60%	Radio 80%	48% (Blue + Radio)
		No Radio 20%	12% (Blue + NO Radio)
Total	100%		100%

(Module 3.1, LOS 3.e)

Question #64 of 105

Question ID: 1456404

For assets A and B we know the following: $E(R_A) = 0.10$, $E(R_B) = 0.10$, $Var(R_A) = 0.18$, $Var(R_B) = 0.36$ and the correlation of the returns is 0.6. What is the variance of the return of a portfolio that is equally invested in the two assets?

A) 0.1102.

B) 0.1500.

C) 0.2114.

Explanation

You are not given the covariance in this problem but instead you are given the correlation coefficient and the variances of assets A and B from which you can determine the covariance by Covariance = (correlation of A, B) × Standard Deviation of A) × (Standard Deviation of B).

Since it is an equally weighted portfolio, the solution is:

$[(0.5^2) \times 0.18] + [(0.5^2) \times 0.36] + [2 \times 0.5 \times 0.5 \times 0.6 \times (0.18^{0.5}) \times (0.36^{0.5})] = 0.045 + 0.09 + 0.0764 = 0.2114$

(Module 3.3, LOS 3.k)

Question #65 of 105

Question ID: 1456406

Use the following probability distribution to calculate the standard deviation for the portfolio.

State of the Economy	Probability	Return on Portfolio
Boom	0.30	15%
Bust	0.70	3%

A) 5.5%.

B) 6.0%.

C) 6.5%.

Explanation

$[0.30 \times (0.15 - 0.066)^2 + 0.70 \times (0.03 - 0.066)^2]^{1/2} = 5.5\%.$

(Module 3.3, LOS 3.k)

Question #66 of 105

Question ID: 1456351

The following table summarizes the results of a poll taken of executives and analysts concerning the economic impact of a pending piece of legislation:

Group	Think it will have a positive impact	Think it will have a negative impact	Total
Executives	40	30	70
Analysts	70	60	130
	110	90	200

What is the probability that a randomly selected individual from this group will be an analyst that thinks that the legislation will have a positive impact on the economy?

A) 0.6464.

B) 0.3575.

C) 0.35.

Explanation

Out of a total of 200 individuals, 70 are analysts who believe legislation will positively impact the economy. We simply need to reflect this as a proportion to work out the probability.

70 analysts / 200 individuals = 0.35.

(Module 3.1, LOS 3.e)

Question #67 of 105

Question ID: 1456389

An analyst announces that an increase in the discount rate next quarter will double her earnings forecast for a firm. This is an example of a:

A) use of Bayes' formula.

B) joint probability.

C) conditional expectation.

Explanation

This is a conditional expectation. The analyst indicates how an expected value will change given another event.

(Module 3.2, LOS 3.i)

Question #68 of 105

Question ID: 1456356

Given the following table about employees of a company based on whether they are smokers or nonsmokers and whether or not they suffer from any allergies, what is the probability of suffering from allergies or being a smoker?

	Suffer from Allergies	Don't Suffer from Allergies	Total
Smoker	35	25	60
Nonsmoker	55	185	240
Total	90	210	300

A) 0.88.

B) 0.38.

C) 0.12.

Explanation

The addition rule for probabilities is used to determine the probability of at least one event among two or more events occurring. The probability of each event is added and the joint probability (if the events are not mutually exclusive) is subtracted to arrive at the solution. P(smoker or allergies) = P(smoker) + P(allergies) – P(smoker and allergies) = (60/300) + (90/300) – (35/300) = 0.20 + 0.30 – 0.117 = 0.38.

Alternatively: 1 – Prob.(Neither) = 1 – (185/300) = 38.3%.

(Module 3.1, LOS 3.e)

Question #69 of 105

Question ID: 1456340

An unconditional probability is *most accurately* described as the probability of an event independent of:

A) its own past outcomes.

B) the outcomes of other events.

C) an observer's subjective judgment.

Explanation

An unconditional probability is one that is not stated as depending on the outcome of another event.

(Module 3.1, LOS 3.d)

Question #70 of 105

Question ID: 1456325

In the context of probability, an event is *most accurately* defined as:

A) a single outcome or a set of outcomes.

B) an experiment used to estimate a probability.

C) an observed value of a random variable.

Explanation

An event is defined as a single outcome or a set of outcomes; an outcome is an observed value of a random variable.

(Module 3.1, LOS 3.a)

Question #71 of 105

Question ID: 1456410

Personal Advisers, Inc., has determined four possible economic scenarios and has projected the portfolio returns for two portfolios for their client under each scenario. Personal's economist has estimated the probability of each scenario as shown in the table below. Given this information, what is the covariance of the returns on Portfolio A and Portfolio B?

Scenario	Probability	Return on Portfolio A	Return on Portfolio B
A	15%	18%	19%
B	20%	17%	18%
C	25%	11%	10%
D	40%	7%	9%

A) 0.001898.

B) 0.890223.

C) 0.002019.

Explanation

S	P (S)	Return on Portfolio A	R_A – $E(R_A)$	Return on Portfolio B	R_B – $E(R_B)$	$[R_A – E(R_A)] \times [R_B – E(R_B)] \times P(S)$
A	15%	18%	6.35%	19%	6.45%	0.000614
B	20%	17%	5.35%	18%	5.45%	0.000583
C	25%	11%	–0.65%	10%	–2.55%	0.000041
D	40%	7%	–4.65%	9%	–3.55%	0.000660
		$E(R_A) = 11.65\%$		$E(R_B) = 12.55\%$		$Cov(R_A,R_B) = 0.001898$

(Module 3.3, LOS 3.l)

Question #72 of 105

Question ID: 1456411

Joe Mayer, CFA, projects that XYZ Company's return on equity varies with the state of the economy in the following way:

State of Economy	Probability of Occurrence	Company Returns
Good	.20	20%
Normal	.50	15%
Poor	.30	10%

The standard deviation of XYZ's expected return on equity is *closest* to:

A) 12.3%.

B) 3.5%.

C) 1.5%.

Explanation

In order to calculate the standard deviation of the company returns, first calculate the expected return, then the variance, and the standard deviation is the square root of the variance.

The expected value of the company return is the probability weighted average of the possible outcomes: (0.20)(0.20) + (0.50)(0.15) + (0.30)(0.10) = 0.145.

The variance is the sum of the probability of each outcome multiplied by the squared deviation of each outcome from the expected return: $(0.2)(0.20 - 0.145)^2 + (0.5)(0.15 - 0.145)^2 + (0.3)(0.1-0.145)^2 = 0.000605 + 0.0000125 + 0.0006075 = 0.001225$.

The standard deviation is the square root of 0.001225 = 0.035 or 3.5%.;

(Module 3.3, LOS 3.l)

Question #73 of 105

Question ID: 1456378

Jay Hamilton, CFA, is analyzing Madison, Inc., a distressed firm. Hamilton believes the firm's survival over the next year depends on the state of the economy. Hamilton assigns probabilities to four economic growth scenarios and estimates the probability of bankruptcy for Madison under each:

Economic growth scenario	Probability of scenario	Probability of bankruptcy
Recession (< 0%)	20%	60%
Slow growth (0% to 2%)	30%	40%
Normal growth (2% to 4%)	40%	20%
Rapid growth (> 4%)	10%	10%

Based on Hamilton's estimates, the probability that Madison, Inc. does not go bankrupt in the next year is *closest* to:

A) 67%.

B) 18%.

C) 33%.

Explanation

Using the total probability rule, the unconditional probability of bankruptcy is (0.2)(0.6) + (0.3)(0.4) + (0.4)(0.2) + (0.1) (0.1) = 0.33. The probability that Madison, Inc. does not go bankrupt is 1 − 0.33 = 0.67 = 67%.

(Module 3.2, LOS 3.g)

Question #74 of 105

Question ID: 1456376

If X and Y are independent events, which of the following is *most* accurate?

A) P(X | Y) = P(X).

B) P(X or Y) = P(X) + P(Y).

C) P(X or Y) = (P(X)) × (P(Y)).

Explanation

Note that events being independent means that they have no influence on each other. It does not necessarily mean that they are mutually exclusive. Accordingly, P(X or Y) = P(X) + P(Y) – P(X and Y). By the definition of independent events, P(X|Y) = P(X).

(Module 3.2, LOS 3.f)

Question #75 of 105

Question ID: 1456364

Data shows that 75 out of 100 tourists who visit New York City visit the Empire State Building. It rains or snows in New York City one day in five. What is the joint probability that a randomly chosen tourist visits the Empire State Building on a day when it neither rains nor snows?

A) 60%. ✓

B) 95%. ✗

C) 15%. ✗

Explanation

A joint probability is the probability that two events occur when neither is certain or a given. Joint probability is calculated by multiplying the probability of each event together. (0.75) × (0.80) = 0.60 or 60%.

(Module 3.1, LOS 3.e)

Question #76 of 105

Question ID: 1456369

There is a 40% probability that the economy will be good next year and a 60% probability that it will be bad. If the economy is good, there is a 50 percent probability of a bull market, a 30% probability of a normal market, and a 20% probability of a bear market. If the economy is bad, there is a 20% probability of a bull market, a 30% probability of a normal market, and a 50% probability of a bear market. What is the joint probability of a good economy and a bull market?

A) 50%. ✗

B) 20%. ✓

C) 12%. ✗

Explanation

The joint probability is the probability that both events, in this case the economy being good *and* the occurrence of a bull market, happening at the same time. It is computed by multiplying the unconditional probability of a good economy (40%) by the conditional probability of a bull market given a good economy (50%): 0.40 × 0.50 = 0.20 or 20%.

State of the Economy (Unconditional Probability)	Market Given State of the Economy (Conditional Probability)	Probability of a Particular State of the Economy AND Market Occurring (Joint Probability)
Good 40%	Bull 50%	**Good + Bull = 40% × 50% = 20%**
	Normal 30%	Good + Normal = 40% × 30% = 12%
	Bear 20%	Good + Bear = 40% × 20% = 8%
Bad 60%	Bull 20%	Bad + Bull = 60% × 20% = 12%
	Normal 30%	Bad + Normal = 60% × 30% = 18%
	Bear 50%	Bad + Bear = 60% × 50% = 30%

(Module 3.1, LOS 3.e)

Question #77 of 105

Question ID: 1456349

An analyst has a list of 20 bonds of which 14 are callable, and five have warrants attached to them. Two of the callable bonds have warrants attached to them. If a single bond is chosen at random, what is the probability of choosing a callable bond or a bond with a warrant?

A) 0.85.

B) 0.55.

C) 0.70.

Explanation

This requires the addition formula, P(callable) + P(warrants) – P(callable and warrants) = P(callable or warrants) = 14/20 + 5/20 – 2/20 = 17/20 = 0.85.

(Module 3.1, LOS 3.e)

Question #78 of 105

Question ID: 1456384

There is a 40% probability that an investment will earn 10%, a 40% probability that the investment will earn 12.5%, and a 20% probability that the investment will earn 30%. What are the mean expected return and the standard deviation of expected returns, respectively?

A) 15.0%; 7.58%.

B) 15.0%; 5.75%.

C) 17.5%; 5.75%.

Explanation

Mean = (0.4)(10) + (0.4)(12.5) + (0.2)(30) = 15%

Var = $(0.4)(10 - 15)^2 + (0.4)(12.5 - 15)^2 + (0.2)(30 - 15)^2 = 57.5$

Standard deviation = $\sqrt{57.5} = 7.58$

(Module 3.2, LOS 3.h)

Question #79 of 105

Question ID: 1456425

Determining the number of ways five tasks can be done in order, requires:

A) only the factorial function.

B) the labeling formula.

C) the permutation formula.

Explanation

The factorial function, denoted n!, tells how many different ways n items can be arranged where all the items are included.

(Module 3.3, LOS 3.n)

Question #80 of 105

Question ID: 1456414

For two random variables, P(X = 20, Y = 0) = 0.4, and P(X = 30, Y = 50) = 0.6. Given that E(X) is 26 and E(Y) is 30, the covariance of X and Y is:

A) 120.00.

B) 125.00.

C) 25.00.

Explanation

The covariance is COV(XY) = (0.4 × ((20 – 26) × (0 – 30))) + ((0.6 × (30 – 26) × (50 – 30))) = 120.

(Module 3.3, LOS 3.l)

Question #81 of 105

Question ID: 1456346

The probability of each of three independent events is shown in the table below. What is the probability of A and C occurring, but not B?

Event	Probability of Occurrence
A	25%
B	15%
C	42%

A) 8.9%.

B) 3.8%.

C) 10.5%.

Explanation

Because all these events are independent, by the multiplication rule P(AC) = (0.25)(0.42)= 0.105 and P(ABC) = (0.25)(0.15)(0.42) = 0.01575. Then P(AC and not B) = P(AC) – P(ABC) = 0.105 – 0.01575 = 0.08925 or 8.9%.

(Module 3.1, LOS 3.e)

Question #82 of 105

Question ID: 1456393

If given the standard deviations of the returns of two assets and the correlation between the two assets, which of the following would an analyst *least likely* be able to derive from these?

A) Covariance between the returns.

B) Strength of the linear relationship between the two.

C) Expected returns.

Explanation

The correlations and standard deviations cannot give a measure of central tendency, such as the expected value.

(Module 3.3, LOS 3.k)

Question #83 of 105

Question ID: 1456334

If the odds against an event occurring are twelve to one, what is the probability that it will occur?

A) 0.0833.

B) 0.9231.

C) 0.0769.

Explanation

If the probability against the event occurring is twelve to one, this means that in thirteen occurrences of the event, it is expected that it will occur once and not occur twelve times. The probability that the event will occur is then: 1/13 = 0.0769.

(Module 3.1, LOS 3.c)

Question #84 of 105

Question ID: 1456396

What is the standard deviation of a portfolio if you invest 30% in stock one (standard deviation of 4.6%) and 70% in stock two (standard deviation of 7.8%) if the correlation coefficient for the two stocks is 0.45?

A) 0.38%.

B) 6.20%.

C) 6.83%.

Explanation

The standard deviation of the portfolio is found by:

$[W_1^2\ \sigma_1^2 + W_2^2\ \sigma_2^2 + 2W_1W_2\sigma_1\sigma_2 r_{1,2}]^{0.5}$, or $[(0.30)^2(0.046)^2 + (0.70)^2(0.078)^2 + (2)(0.30)(0.70)(0.046)(0.078)(0.45)]^{0.5} = 0.0620$, or 6.20%.

(Module 3.3, LOS 3.k)

Question #85 of 105

Question ID: 1456413

For two random variables, P(X = 2, Y = 10) = 0.3, P(X = 6, Y = 2.5) = 0.4, and P(X = 10, Y = 0) = 0.3. Given that E(X) is 6 and E(Y) is 4, the covariance of X and Y is:

A) -12.0.

B) 24.0.

C) 6.0.

Explanation

The covariance is COV(XY) = ((0.3 × ((2 – 6) × (10 – 4))) + ((0.4 × ((6 – 6) × (2.5 – 4))) + (0.3 × ((10 – 6) × (0 – 4))) = –12.

(Module 3.3, LOS 3.l)

Question #86 of 105

Question ID: 1456387

Use the following data to calculate the standard deviation of the return:

- 50% chance of a 12% return
- 30% chance of a 10% return
- 20% chance of a 15% return

A) 3.0%.

B) 2.5%.

C) 1.7%.

Explanation

The standard deviation is the positive square root of the variance. The variance is the expected value of the squared deviations around the expected value, weighted by the probability of each observation. The expected value is: (0.5) × (0.12) + (0.3) × (0.1) + (0.2) × (0.15) = 0.12. The variance is: (0.5) × $(0.12 – 0.12)^2$ + (0.3) × $(0.1 – 0.12)^2$ + (0.2) × $(0.15 – 0.12)^2$ = 0.0003. The standard deviation is the square root of 0.0003 = 0.017 or 1.7%.

(Module 3.2, LOS 3.h)

Question #87 of 105

Question ID: 1456371

Based on historical data, Metro Utilities increases its dividend in 80% of years when GDP increases and 30% of years in which GDP decreases. An analyst believes that there is a 30% probability that GDP will decrease next year. Based on these data and estimates, the probability that GDP will increase next year and Metro will increase its dividend is:

A) 14%.

B) 24%.

C) 56%.

Explanation

P(AB) = P(A | B)P(B) = 0.7 × 0.8 = 0.56.

(Module 3.1, LOS 3.e)

Question #88 of 105

Question ID: 1456353

Given the following table about employees of a company based on whether they are smokers or nonsmokers and whether or not they suffer from any allergies, what is the probability of being either a nonsmoker or not suffering from allergies?

	Suffer from Allergies	Don't Suffer from Allergies	Total
Smoker	35	25	60
Nonsmoker	55	185	240
Total	90	210	300

A) 0.38.

B) 0.50.

C) 0.88.

Explanation

The probability of being a nonsmoker is 240 / 300 = 0.80. The probability of not suffering from allergies is 210 / 300 = 0.70. The probability of being a nonsmoker and not suffering from allergies is 185 / 300 = 0.62. Since the question asks for the probability of being either a nonsmoker or not suffering from allergies we have to take the probability of being a nonsmoker plus the probability of not suffering from allergies and subtract the probability of being both: 0.80 + 0.70 − 0.62 = 0.88.

Alternatively: 1 – P(Smoker & Allergies) = 1 – (35 / 300) = 88.3%.

(Module 3.1, LOS 3.e)

Question #89 of 105

Question ID: 1456370

There is a 40% probability that the economy will be good next year and a 60% probability that it will be bad. If the economy is good, there is a 50 percent probability of a bull market, a 30% probability of a normal market, and a 20% probability of a bear market. If the economy is bad, there is a 20% probability of a bull market, a 30% probability of a normal market, and a 50% probability of a bear market. What is the probability of a bull market next year?

A) 20%.

B) 32%.

C) 50%.

Explanation

Because a good economy and a bad economy are mutually exclusive, the probability of a bull market is the sum of the joint probabilities of (good economy and bull market) and (bad economy and bull market): (0.40 × 0.50) + (0.60 × 0.20) = 0.32 or 32%.

State of the Economy (Unconditional Probability)	Market Given State of the Economy (Conditional Probability)	Probability of a Particular State of the Economy AND Market Occurring (Joint Probability)
Good 40%	Bull 50%	**Good + Bull = 40% × 50% = 20%**
	Normal 30%	Good + Normal = 40% × 30% = 12%
	Bear 20%	Good + Bear = 40% × 20% = 8%
Bad 60%	Bull 20%	**Bad + Bull = 60% × 20% = 12%**
	Normal 30%	Bad + Normal = 60% × 30% = 18%
	Bear 50%	Bad + Bear = 60% × 50% = 30%

(Module 3.1, LOS 3.e)

Question #90 of 105

Question ID: 1456368

A parking lot has 100 red and blue cars in it.

- 40% of the cars are red.
- 70% of the red cars have radios.
- 80% of the blue cars have radios.

What is the probability of selecting a car at random that is either red or has a radio?

A) 76%.

B) 88%.

C) 28%.

Explanation

The addition rule for probabilities is used to determine the probability of at least one event among two or more events occurring, in this case a car being red *or* having a radio. To use the addition rule, the probabilities of each individual event are added together, and, if the events are not mutually exclusive, the joint probability of both events occurring at the same time is subtracted out: P(red or radio) = P(red) + P(radio) – P(red and radio) = 0.40 + 0.76 – 0.28 = 0.88 or 88%.

(Module 3.1, LOS 3.e)

Question #91 of 105

Question ID: 1456359

Avery Scott, financial planner, recently obtained his CFA Charter and is considering multiple job offers. Scott devised the following four criteria to help him decide which offers to pursue most aggressively.

Criterion	% Expected to Meet the Criteria
1. Within 75 miles of San Francisco	0.85
2. Employee size less than 50	0.50
3. Compensation package exceeding $100,000	0.30
4. Three weeks of vacation	0.15

If Scott has 20 job offers and the probabilities of meeting each criterion are independent, how many are expected to meet all of his criteria? (Round to nearest whole number).

A) 0.

B) 1.

C) 3.

Explanation

We will use the multiplication rule to calculate this probability.

P(1, 2, 3, 4) = P(1) × P(2) × P(3) × P(4)

= 0.85 × 0.50 × 0.30 × 0.15 = 0.019125

Number of offers expected to meet the criteria = 0.019125 × 20 = 0.3825, or 0.

(Module 3.1, LOS 3.e)

Question #92 of 105

Question ID: 1456420

A parking lot has 100 red and blue cars in it.

- 40% of the cars are red.
- 70% of the red cars have radios.
- 80% of the blue cars have radios.

What is the probability that the car is red given that it has a radio?

A) 47%. ✗

B) 28%. ✗

C) 37%. ✓

Explanation

Given a set of prior probabilities for an event of interest, Bayes' formula is used to update the probability of the event, in this case that the car we already know has a radio is red. Bayes' formula says to divide the Probability of New Information given Event by the Unconditional Probability of New Information and multiply that result by the Prior Probability of the Event. In this case, P(red car has a radio) = 0.70 is divided by 0.76 (which is the Unconditional Probability of a car having a radio (40% are red of which 70% have radios) plus (60% are blue of which 80% have radios) or ((0.40) × (0.70)) + ((0.60) × (0.80)) = 0.76.) This result is then multiplied by the Prior Probability of a car being red, 0.40. The result is (0.70 / 0.76) × (0.40) = 0.37 or 37%.

(Module 3.3, LOS 3.m)

Question #93 of 105

Question ID: 1456344

The multiplication rule of probability is used to calculate the:

A) joint probability of two events.

B) unconditional probability of an event, given conditional probabilities.

C) probability of at least one of two events.

Explanation

The multiplication rule of probability is stated as: P(AB) = P(A|B) × P(B), where P(AB) is the joint probability of events A and B.

(Module 3.1, LOS 3.e)

Question #94 of 105

Question ID: 1456377

The unconditional probability of an event, given conditional probabilities, is determined by using the:

A) addition rule of probability.

B) multiplication rule of probability.

C) total probability rule.

Explanation

The total probability rule is used to calculate the unconditional probability of an event from the conditional probabilities of the event, given a mutually exclusive and exhaustive set of outcomes. The rule is expressed as:

$$P(A) = P(A|B_1)P(B_1) + P(A|B_2)P(B_2) + \ldots + P(A|B_n)P(B_n)$$

(Module 3.2, LOS 3.g)

Question #95 of 105

Question ID: 1456373

A bag of marbles contains 3 white and 4 black marbles. A marble will be drawn from the bag randomly three times and put back into the bag. Relative to the outcomes of the first two draws, the probability that the third marble drawn is white is:

A) conditional.

B) dependent.

C) independent.

Explanation

Each draw has the same probability, which is not affected by previous outcomes. Therefore each draw is an independent event.

(Module 3.2, LOS 3.f)

Question #96 of 105

Question ID: 1456328

Which of the following is an empirical probability?

A) The probability the Fed will lower interest rates prior to the end of the year.

B) On a random draw, the probability of choosing a stock of a particular industry from the S&P 500 based on the number of firms.

C) For a stock, based on prior patterns of up and down days, the probability of the stock having a down day tomorrow.

Explanation

There are three types of probabilities: *a priori*, empirical, and subjective. An empirical probability is calculated by analyzing past data.

(Module 3.1, LOS 3.b)

Question #97 of 105

Question ID: 1456354

A very large company has twice as many male employees relative to female employees. If a random sample of four employees is selected, what is the probability that all four employees selected are female?

A) 0.0123.

B) 0.0625.

C) 0.3333.

Explanation

Since there are twice as many male employees to female employees, P(male) = 2/3 and P(female) = 1/3. Therefore, the probability of selecting four female employees = $(0.333)^4$ = 0.0123.

(Module 3.1, LOS 3.e)

Question #98 of 105

Question ID: 1456327

If two events are mutually exclusive, the probability that they both will occur at the same time is:

A) 0.00.

B) Cannot be determined from the information given.

C) 0.50.

Explanation

If two events are mutually exclusive, it is not possible to occur at the same time. Therefore, the $P(A \cap B) = 0$.

(Module 3.1, LOS 3.b)

Question #99 of 105

Question ID: 1456342

The probability of a new office building being built in town is 64%. The probability of a new office building that includes a coffee shop being built in town is 58%. If a new office building is built in town, the probability that it includes a coffee shop is *closest* to:

A) 91%.

B) 37%.

C) 58%.

Explanation

P(new office) = 64% (unconditional probability)

P(new office and coffee shop) = 58% (joint probability)

We are trying to calculate the conditional probability P(coffee shop | new office).

P(new office and coffee shop) = P(new office) × P(coffee shop | new office)

P(coffee shop | new office) = P(new office and a coffee shop) / P(new office), or 58% / 64% = 90.63%.

(Module 3.1, LOS 3.d)

Question #100 of 105

Question ID: 1456421

Question #100 of 105

Question ID: 1456421

A portfolio manager wants to eliminate four stocks from a portfolio that consists of six stocks. How many ways can the four stocks be sold when the order of the sales is important?

A) 360.

B) 24.

C) 180.

Explanation

This is a choose four from six problem where order is important. Thus, it requires the permutation formula: n! / (n – r)! = 6! / (6 – 4)! = 360.

With TI calculator: 6 [2nd][nPr] 4 = 360.

(Module 3.3, LOS 3.n)

Question #101 of 105

Question ID: 1456381

The probability of a good economy is 0.55 and the probability of a poor economy is 0.45. Given a good economy, the probability that the earnings of HomeBuilder Inc. will increase is 0.60 and the probability that earnings will not increase is 0.40. Given a poor economy, the probability that earnings will increase is 0.30 and the probability that earnings will not increase is 0.70. The unconditional probability that earnings will increase is *closest* to:

A) 0.18.

B) 0.33.

C) 0.47.

Explanation

Using the total probability rule, we can calculate the unconditional probability of an increase in earnings as follows:

$$P(H_I) = P(H_I \mid E) \times P(E) + P(HI \mid E_P) \times P(E_P)$$

where:

$P(E) = 0.55$, the unconditional probability of a good economy

$P(E_P) = 0.45$, the unconditional probability of a poor economy

$P(H_I \mid E) = 0.6$, the probability of an increase in HomeBuilder Inc.'s earnings given a good economy

$P(H_I \mid E_P) = 0.3$, the probability of an increase in HomeBuilder Inc.'s earnings given a poor economy

$P(H_I) = 0.60 \times 0.55 + 0.30 \times 0.45 = 0.33 + 0.135 = 0.465 \approx 0.47.$

(Module 3.2, LOS 3.g)

Question #102 of 105

Question ID: 1456416

The probability of A is 0.4. The probability of A^C is 0.6. The probability of $(B \mid A)$ is 0.5, and the probability of $(B \mid A^C)$ is 0.2. Using Bayes' formula, what is the probability of $(A \mid B)$?

A) 0.625.

B) 0.375.

C) 0.125.

Explanation

Using the total probability rule, we can compute the

$P(B)$: $P(B) = [P(B \mid A) \times P(A)] + [P(B \mid A^C) \times P(A^C)]$

$P(B) = [0.5 \times 0.4] + [0.2 \times 0.6] = 0.32$

Using Bayes' formula, we can solve for

$P(A \mid B)$: $P(A \mid B) = [\, P(B \mid A) \div P(B)\,] \times P(A) = [0.5 \div 0.32] \times 0.4 = 0.625$

(Module 3.3, LOS 3.m)

Question #103 of 105

Question ID: 1456362

The following table summarizes the availability of trucks with air bags and bucket seats at a dealership.

	Bucket Seats	No Bucket Seats	Total
Air Bags	75	50	125
No Air Bags	35	60	95
Total	110	110	220

What is the probability of randomly selecting a truck with air bags and bucket seats?

A) 28%.

B) 34%.

C) 16%.

Explanation

From the table, the number of trucks with both airbags and bucket seats is 75.

The probability is that number as a percentage of the total number of trucks, 220.

75 / 220 = 0.34.

(Module 3.1, LOS 3.e)

Question #104 of 105

Question ID: 1456401

Given P(X = 2) = 0.3, P(X = 3) = 0.4, P(X = 4) = 0.3. What is the variance of X?

A) 0.3.

B) 0.6.

C) 3.0.

Explanation

The variance is the sum of the squared deviations from the expected value weighted by the probability of each outcome.

The expected value is E(X) = 0.3 × 2 + 0.4 × 3 + 0.3 × 4 = 3.

The variance is $0.3 \times (2 - 3)^2 + 0.4 \times (3 - 3)^2 + 0.3 \times (4 - 3)^2 = 0.6$.

(Module 3.3, LOS 3.k)

Question #105 of 105

Question ID: 1456417

Bonds rated B have a 25% chance of default in five years. Bonds rated CCC have a 40% chance of default in five years. A portfolio consists of 30% B and 70% CCC-rated bonds. If a randomly selected bond defaults in a five-year period, what is the probability that it was a B-rated bond?

A) 0.211.

B) 0.250.

C) 0.625.

Explanation

According to Bayes' formula: P(B | default) = P(default and B) / P(default).

P(default and B) = P(default | B) × P(B) = 0.250 × 0.300 = 0.075

P(default and CCC) = P(default | CCC) × P(CCC) = 0.400 × 0.700 = 0.280

P(default) = P(default and B) + P(default and CCC) = 0.355

P(B | default) = P(default and B) / P(default) = 0.075 / 0.355 = 0.211

(Module 3.3, LOS 3.m)