

## Question #1 of 117

Question ID: 413030

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.

## Question #2 of 117

Question ID: 413114

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 expected returns on 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) 9.51%.
- B) 4.34%.
- C) 12.55%.

### Explanation

Scenario	Probability	Return on Portfolio B	$P \times [R_B - E(R_B)]^2$
A	15%	19%	0.000624
B	20%	18%	0.000594
C	25%	10%	0.000163
D	40%	9%	0.000504
		$E(R_B) = 12.55\%$	$\sigma^2 = 0.001885$
			$\sigma = 0.$

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### Question #3 of 117

Question ID: 413123

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

- A) 0.375.
- B) 0.625.
- C) 0.125.

#### Explanation

Using the total probability rule, we can compute the  $P(B)$ :

$$P(B) = [P(B | A) \times P(A)] + [P(B | A^c) \times P(A^c)]$$

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

Using Bayes' formula, we can solve for  $P(A | B)$ :

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

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### Question #4 of 117

Question ID: 413027

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

#### Explanation

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

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### Question #5 of 117

Question ID: 413048

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) 10.5%.

B) 8.9%.

C) 3.8%.

Explanation

Using the multiplication rule:  $(0.25)(0.42) - (0.25)(0.15)(0.42) = 0.08925$  or 8.9%

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**Question #6 of 117**

Question ID: 413073

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 both suffering from allergies and not suffering from allergies?

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

A) 0.00.

B) 0.50.

C) 1.00.

Explanation

These are mutually exclusive, so the joint probability is zero.

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**Question #7 of 117**

Question ID: 413112

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:  $(0.5) \times (0.12) + (0.3) \times (0.1) + (0.2) \times (0.15) = 0.12$ . The variance is:  $(0.5) \times (0.12 - 0.12)^2 + (0.3) \times (0.1 - 0.12)^2 + (0.2) \times (0.15 - 0.12)^2 = 0.0003$ . The standard deviation is the square root of  $0.0003 = 0.017$  or 1.7%.

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## Question #8 of 117

Question ID: 413132

If a firm is going to create three teams of four from twelve employees. Which approach is the most appropriate for determining how the twelve employees can be selected for the three teams?

- A) Combination formula.
- B) Permutation formula.
- C) Labeling formula.

### Explanation

This problem is a labeling problem where the 12 employees will be assigned one of three labels. It requires the labeling formula.

In this case there are  $[(12!) / (4!4!4!)] = 34,650$  ways to group the employees.

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## Question #9 of 117

Question ID: 413074

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) 0.50.
- B) 0.24.
- C) 0.86.

### Explanation

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

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B), \text{ where } P(A \text{ and } B) = P(A) \times P(B)$$

$$P(A \text{ or } B) = 0.80 + 0.30 - (0.8 \times 0.3) = 0.86$$

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## Question #10 of 117

Question ID: 413045

The multiplication rule of probability is used to calculate the:

- A) unconditional probability of an event, given conditional probabilities.
- B) joint probability of two events.
- C) probability of at least one of two events.

### Explanation

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

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## Question #11 of 117

Question ID: 413041

Which of the following probabilities is an example of an unconditional probability? The probability that the economy will enter a recession:

- A) any time in the next three years.
- B) in the next year if tax rates increase.
- C) in the next two years if interest rates increase.

### Explanation

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

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## Question #12 of 117

Question ID: 413127

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) 24.
- B) 360.
- 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:  $6 [2nd][nPr] 4 = 360$ .

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## Question #13 of 117

Question ID: 413032

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 5.
- B) 1 to 4.
- 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.

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## Question #14 of 117

Question ID: 413064

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) 7.7%.
- B) 64.2%.
- C) 10.5%.

### Explanation

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

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## Question #15 of 117

Question ID: 413118

There is a 30% chance that the economy will be good and a 70% chance that it will be bad. If the economy is good, your returns will be 20% and if the economy is bad, your returns will be 10%. What is your expected return?

- A) 17%.
- B) 15%.
- C) 13%.

### Explanation

Expected value is the probability weighted average of the possible outcomes of the random variable. The expected return is:  $((0.3) \times (0.2)) + ((0.7) \times (0.1)) = (0.06) + (0.07) = 0.13$ .

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## Question #16 of 117

Question ID: 413087

There is a 90% chance that the economy will be good next year and a 10% chance that it will be bad. If the economy is good, there is a 60% chance that XYZ Incorporated will have EPS of \$4.00 and a 40% chance that their earnings will be \$3.00. If the economy is bad, there is an 80% chance that XYZ Incorporated will have EPS of \$2.00 and a 20% chance that their earnings will be \$1.00. What is the firm's expected EPS?

- A) \$5.40.
- B) \$3.42.
- C) \$2.50.

### Explanation

The expected EPS is calculated by multiplying the probability of the economic environment by the probability of the particular EPS and the EPS in each case. The expected EPS in all four outcomes are then summed to arrive at the expected EPS:

$$(0.90 \times 0.60 \times \$4.00) + (0.90 \times 0.40 \times \$3.00) + (0.10 \times 0.80 \times \$2.00) + (0.10 \times 0.20 \times \$1.00) = \$2.16 + \$1.08 + \$0.16 + \$0.02 = \$3.42.$$

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### Question #17 of 117

Question ID: 485759

The following table shows the individual weightings and expected returns for the three stocks in an investor's portfolio:

<u>Stock</u>	<u>Weight</u>	<u>E(R<sub>X</sub>)</u>
V	0.40	12%
M	0.35	8%
S	0.25	5%

What is the expected return of this portfolio?

- A) 9.05%.
- B) 8.85%.
- C) 8.33%.

#### Explanation

To solve this problem, we need to use the formula for the expected return of a portfolio:  $E(R_P) = w_1E(R_1) + w_2E(R_2) + \dots + w_nE(R_n)$

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

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### Question #18 of 117

Question ID: 413050

Which of the following is a joint probability? The probability that a:

- A) stock increases in value after an increase in interest rates has occurred.
- B) company merges with another firm next year.
- C) stock pays a dividend and splits next year.

#### Explanation

A joint probability applies to two events that both must occur.

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### Question #19 of 117

Question ID: 413033

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

- A) a priori probability.
- B) past lottery history.
- C) the best estimate of the Department of Gaming.

#### Explanation

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

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### Question #20 of 117

Question ID: 413121

Given  $P(X = 20, Y = 0) = 0.4$ , and  $P(X = 30, Y = 50) = 0.6$ , then  $\text{COV}(XY)$  is:

- A) 125.00.
- B) 120.00.
- C) 25.00.

#### Explanation

The expected values are:  $E(X) = (0.4 \times 20) + (0.6 \times 30) = 26$ , and  $E(Y) = (0.4 \times 0) + (0.6 \times 50) = 30$ . The covariance is  $\text{COV}(XY) = (0.4 \times ((20 - 26) \times (0 - 30))) + ((0.6 \times (30 - 26) \times (50 - 30))) = 120$ .

### Question #21 of 117

Question ID: 413065

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) 1.
- B) 3.
- C) 0.

#### Explanation

We will use the multiplication rule to calculate this probability.

$$\begin{aligned} P(1, 2, 3, 4) &= P(1) \times P(2) \times P(3) \times P(4) \\ &= 0.85 \times 0.50 \times 0.30 \times 0.15 = 0.019125 \end{aligned}$$

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

### Question #22 of 117

Question ID: 413124



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) 0.625.

Ⓑ B) 0.250.

Ⓒ C) 0.211.

Explanation

According to Bayes' formula:  $P(B / \text{default}) = P(\text{default and B}) / P(\text{default})$ .

$$P(\text{default and B}) = P(\text{default} / B) \times P(B) = 0.250 \times 0.300 = 0.075$$

$$P(\text{default and CCC}) = P(\text{default} / CCC) \times P(CCC) = 0.400 \times 0.700 = 0.280$$

$$P(\text{default}) = P(\text{default and B}) + P(\text{default and CCC}) = 0.355$$

$$P(B / \text{default}) = P(\text{default and B}) / P(\text{default}) = 0.075 / 0.355 = 0.211$$

**Question #23 of 117**

Question ID: 413113

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) 4.53%.

Ⓐ B) 1.140%.

Ⓑ C) 5.992%.

Explanation

$$E(R_A) = 11.65\%$$

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

$$\sigma = 0.$$

**Question #24 of 117**

Question ID: 434199

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) 32%.
- B) 20%.
- 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):  $(0.40 \times 0.50) + (0.60 \times 0.20) = 0.32$  or 32%.

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### Question #25 of 117

Question ID: 413081

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) 18.3%.
- C) 12.3%.

#### Explanation

$E(r) = (0.70 \times 0.12) + (0.30 \times 0.40 \times 0.30) + (0.30 \times 0.60 \times 0.25) = 0.165$ .

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### Question #26 of 117

Question ID: 413034

Which of the following is an a priori probability?

- A) For a stock, based on prior patterns of up and down days, the probability of the stock having a down day tomorrow.
- B) The probability the Fed will lower interest rates prior to the end of the year.
- C) On a random draw, the probability of choosing a stock of a particular industry from the S&P 500.

#### Explanation

A priori probability is based on formal reasoning and inspection. Given the number of stocks in the airline industry in the S&P500 for example, the a priori probability of selecting an airline stock would be that number divided by 500.

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### Question #27 of 117

Question ID: 413102

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:

- $\sigma_R = 34\%$
- $\sigma_S = 16\%$
- $r_{R,S} = 0.67$
- $W_R = 80\%$
- $W_S = 20\%$

- Ⓐ A) 29.4%.
- Ⓑ B) 8.7%.
- Ⓒ C) 7.8%.

#### Explanation

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

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

$$s = [(0.8^2 \times 0.34^2) + (0.2^2 \times 0.16^2) + (2 \times 0.8 \times 0.2 \times 0.34 \times 0.16 \times 0.67)]^{1/2} = [0.073984 + 0.001024 + 0.0007296]^{1/2} = 0.02944, \text{ or approximately } 2.944\%.$$

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### Question #28 of 117

Question ID: 413026

For a stock, which of the following is least likely a random variable? Its:

- Ⓐ A) stock symbol.
- Ⓑ B) current ratio.
- Ⓒ C) most recent closing price.

#### Explanation

A random variable must be a number. Sometimes there is an obvious method for assigning a number, such as when the random variable is a number itself, like a P/E ratio. A stock symbol of a randomly selected stock could have a number assigned to it like the number of letters in the symbol. The symbol itself cannot be a random variable.

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### Question #29 of 117

Question ID: 413025

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

- Ⓐ A) Cannot be determined from the information given.
- Ⓑ B) 0.50.
- Ⓒ C) 0.00.

#### Explanation

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

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Question #30 of 117

Question ID: 413094

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

Event	P(R <sub>i</sub> )	R <sub>A</sub>	R <sub>B</sub>
Recession	0.10	-5%	4%
Below Average	0.30	-2%	8%
Normal	0.50	10%	10%
Boom	0.10	31%	12%

A) 0.00032.

B) 0.00174.

C) 0.00109.

Explanation

Find the weighted average return for each stock.

Stock A:  $(0.10)(-5) + (0.30)(-2) + (0.50)(10) + (0.10)(31) = 7\%$ .

Stock B:  $(0.10)(4) + (0.30)(8) + (0.50)(10) + (0.10)(12) = 9\%$ .

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.

$[(-0.05 - 0.07) \times (0.04 - 0.09)](0.1) + [(-0.02 - 0.07) \times (0.08 - 0.09)](0.3) + [(0.10 - 0.07) \times (0.10 - 0.09)](0.5) + [(0.31 - 0.07) \times (0.12 - 0.09)](0.1) = 0.0006 + 0.00027 + 0.00015 + 0.00072 = 0.00174$ .

Question #31 of 117

Question ID: 413060

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) 9.25%.

B) 11.55%.

C) 10.75%.

### Explanation

The expected return is equal to the sum of the products of the probabilities of the scenarios and their respective returns: =  $(0.15)(0.17) + (0.20)(0.14) + (0.25)(0.12) + (0.40)(0.08) = 0.1155$  or 11.55%.

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### Question #32 of 117

Question ID: 413077

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) statistically independent.

### Explanation

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

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### Question #33 of 117

Question ID: 413067

The probability of a new Wal-Mart being built in town is 64%. If Wal-Mart comes to town, the probability of a new Wendy's restaurant being built is 90%. What is the probability of a new Wal-Mart and a new Wendy's restaurant being built?

- A) 0.675.
- B) 0.306.
- C) 0.576.

### Explanation

$$P(AB) = P(A|B) \times P(B)$$

The probability of a new Wal-Mart and a new Wendy's is equal to the probability of a new Wendy's "if Wal-Mart" (0.90) times the probability of a new Wal-Mart (0.64).  $(0.90)(0.64) = 0.576$ .

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### Question #34 of 117

Question ID: 413115

For assets A and B we know the following:  $E(R_A) = 0.10$ ,  $E(R_B) = 0.10$ ,  $\text{Var}(R_A) = 0.18$ ,  $\text{Var}(R_B) = 0.36$  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) 0.1500.
- B) 0.1102.
- 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  $\text{Covariance} = (\text{correlation of A, B}) \times (\text{Standard Deviation of A}) \times (\text{Standard Deviation of B})$ .

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