1.03 Statistical Measures of Asset Returns

Question 1
A distribution of returns has the same mean, standard deviation, and skewness as a normal distribution but has a kurtosis of 3.4. Compared with a normal distribution, this distribution indicates returns are *more likely*:
A. near the mean and in the extremes.
B. near the mean and less likely in the extremes.
C. in the extremes and less likely near the mean.

Question 2
A positively skewed return distribution with a mean of 0% *most likely* has:
A. few extreme returns in the right tail.
B. frequent small returns in the right tail.
C. frequent extreme returns in the right tail.

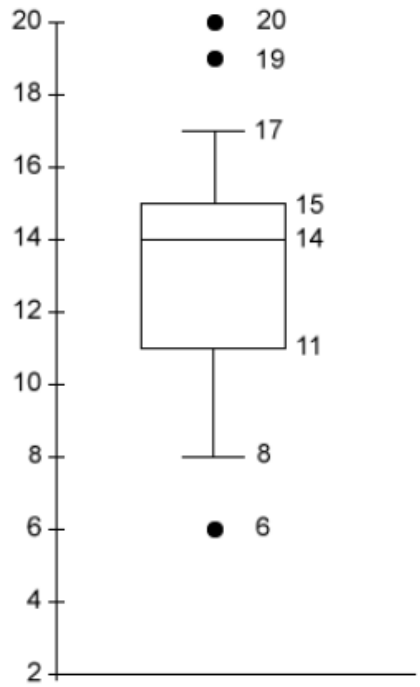
Question 3
A researcher collects the following sales data on 10 companies:

Company	A	B	C	D	E	F	G	H	I	J
Sales ($ millions)	2.9	7.4	20	17.4	19.5	2.6	9.3	10.7	7.2	8.3

Based on this data, the second quintile for sales (in $ millions) is *closest* to:
A. 7.20
B. 7.76
C. 7.96

Question 4
Which of the following *most appropriately* describes a property of the mode?
A. It can be used with nominal data.
B. It is the middle value of a distribution.
C. All distributions have at least one mode.

Question 5
An analyst collects P/E ratios from companies within an industry and plots them on a box and whisker chart:



The third and fourth quartiles are *closest* to:
A. 15 and 17
B. 15 and 20
C. 17 and 20

Question 6
An analyst determines that a return distribution has the same mean, standard deviation, and skewness as a normal distribution, but has an excess kurtosis of 2.2. If an analyst incorrectly assumes the returns are normally distributed, then in this analysis, extreme values would *most likely* be:
A. underrepresented.
B. accurately represented.
C. overrepresented.

Question 7
An analyst compares the risk of Portfolio A to Portfolio B over the last four years and gathers the following information about both portfolios:

Portfolio B Annual Returns (%)
−4
11
2
−13

	Portfolio A	Portfolio B
Mean (%)	1	−1
Range (%)	23	
Mean Absolute Deviation	8	
Sample Standard Deviation	10.49	10.10

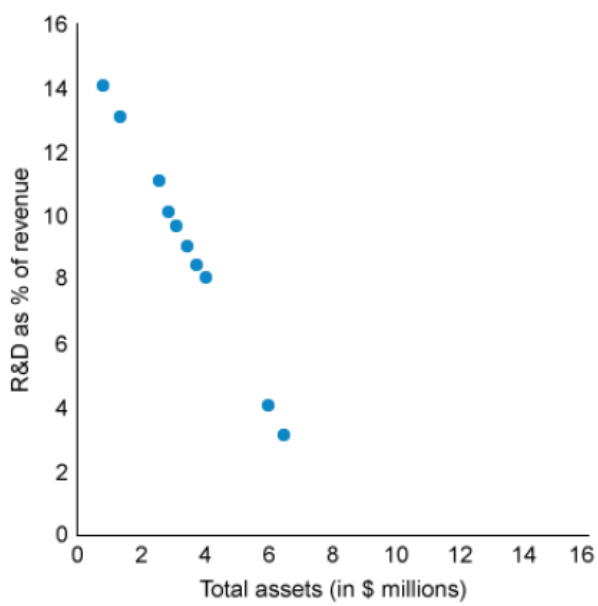
The comparison shows that Portfolio B is riskier in terms of the:
A. range only.
B. range and mean absolute deviation only.
C. range, mean absolute deviation, and standard deviation.

Question 8
One month of historical daily price change data is given below for two investments:

	Mean	Standard Deviation
Investment X	USD 3.37	USD 41.45
Investment Y	JPY 47.03	JPY 283.43

The relative dispersion of the daily price change data for Investment Y is approximately:
A. 1/2 that of Investment X.
B. 7 times that of Investment X.
C. 14 times that of Investment X.

Question 9
The total assets of 10 different companies, as well as their research and development (R&D) spending as a percentage of revenue, are mapped on the following scatterplot:



Company	Total assets	R&D as % of revenue
1	1.0	14.0
2	1.5	13.0
3	2.5	11.0
4	3.0	10.0
5	3.2	9.6
6	3.5	9.0
7	3.8	8.4
8	4.0	8.0
9	6.0	4.0
10	6.5	3.0

The correlation between total assets and R&D spending is *closest* to:
A. −2.0
B. −1.0
C. 1.0

Question 10
An analyst identifies the presence of outliers in a sample containing the P/E ratios of 40 companies. The analyst discards the two smallest and the two largest observations before calculating the average P/E ratio. This process *best* describes the use of a:
A. trimmed mean.
B. harmonic mean.
C. winsorized mean.

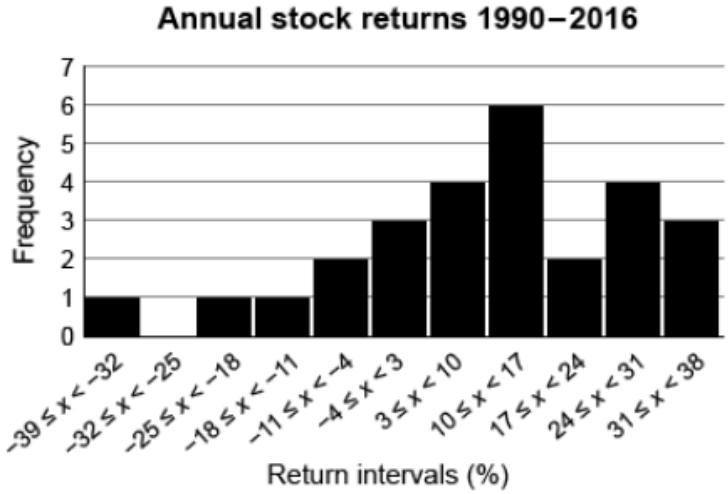
Question 11
For a positively skewed distribution, *most likely* the
A. mean is less than the mode.
B. probability of extreme events in both tails is greater than for a normal distribution.
C. probability of a negative outcome is greater than the probability of a positive outcome.

Question 12
The annual returns for a mutual fund are shown below:

Year	1	2	3	4	5	6	7	8	9	10	11	12
Return (%)	−3.8	1.6	5.1	13.0	−3.6	5.3	3.8	−4.0	4.5	1.6	6.0	1.6

The median return (in %) is *closest* to:
A. 1.6
B. 2.7
C. 4.6

Question 13
An analyst constructs the following histogram of S&P 500 Index annual returns:



In this histogram, the median observation is in an interval that:
A. is the modal interval.
B. lies below the modal interval.
C. lies above the modal interval.

Question 14
An analyst collects the following data for a group of companies:

Company	P/E ratio
A	45
B	16
C	41
D	29
E	10

An analyst wants to calculate an average P/E ratio while giving less weight to larger observations. Using the most appropriate approach, the average P/E ratio is *closest* to:
A. 20.53
B. 24.35
C. 28.20

Question 15
The monthly returns for a mutual fund are:

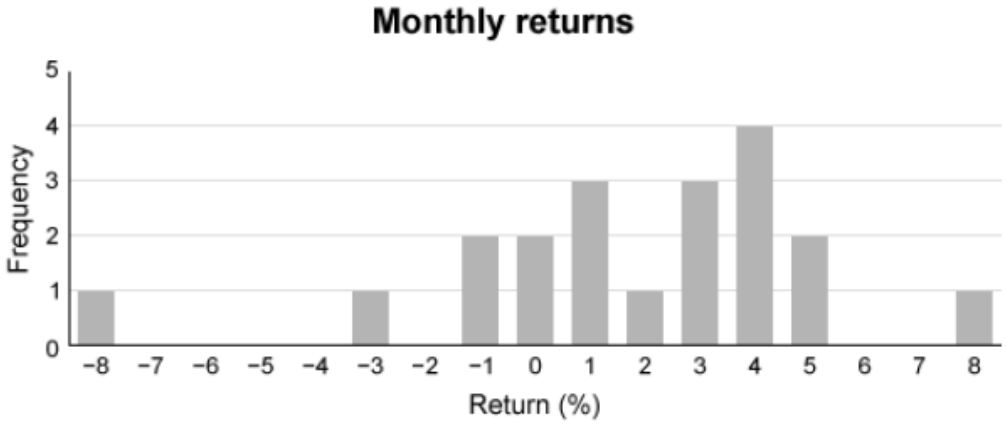
Month	Return (%)
1	3.0
2	−0.5
3	0.0
4	1.1
5	−1.2
6	−2.3
7	1.6
8	2.0

If the target monthly return is 1.5%, the fund's target semideviation (%) is *closest* to:
A. 1.88
B. 2.00
C. 2.65

Question 16
An otherwise normal distribution has a skewness of −0.77. Regarding the distribution's measures of central tendency, it is *most likely* that its:
A. mean is larger than its mode.
B. median is larger than its mean.
C. median is larger than its mode.

Question 17
.A one-week sample of daily closing net asset values for a fund is randomly selected. The observations for the week were 38, 41, 35, 51, and 45. The mean absolute deviation (MAD) for this sample is *closest* to:
A. 0.0
B. 4.8
C. 6.0

Question 18
An analyst prepares a frequency distribution graph of monthly returns:



The value of the median return is *closest* to:
A. 1.75%
B. 2.50%
C. 4.00%

Question 19
An analyst gathers statistics based on comparable samples taken from the returns of three index exchange-traded funds (index ETFs):

Index ETF	Sample Standard Deviation (% return)	Sample Mean (% return)
X	11.5	8.2
Y	9.4	5.9
Z	5.1	1.7

Which of these funds has the *smallest* relative dispersion?
A. Index ETF X
B. Index ETF Y
C. Index ETF Z

Question 20
For four years, an investor invests €1,000,000 annually in a stock at the following prices (per share):

	Purchase Price of Security (€)
Year 1	120
Year 2	130
Year 3	155
Year 4	175

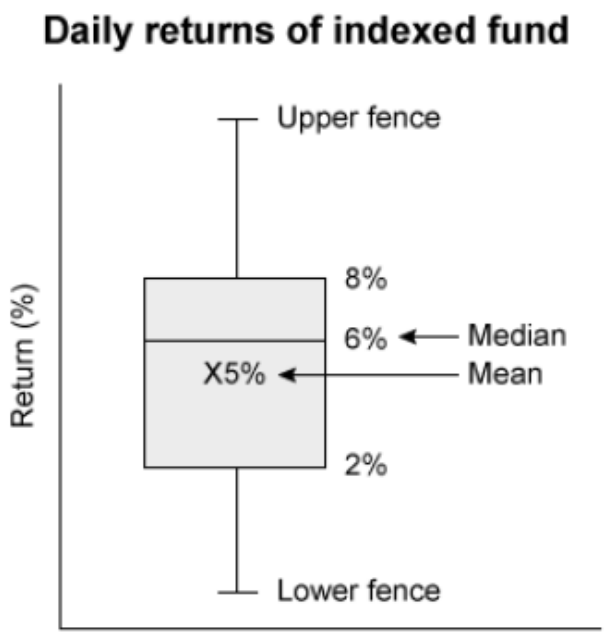
The average price per share paid for the stock over the four-year period is *closest* to:
A. €141.89
B. €143.42
C. €145.00

Question 21
A fund has the following monthly returns over 11 months:

Month	Return
1	5%
2	7%
3	6%
4	–3%
5	–1%
6	9%
7	6%
8	2%
9	5%
10	13%
11	11%

The data set's interquartile range is *closest* to:
A. 4%
B. 5%
C. 7%

Question 22
An analyst prepares the following box and whisker chart that displays a summary of the daily returns on an indexed fund:



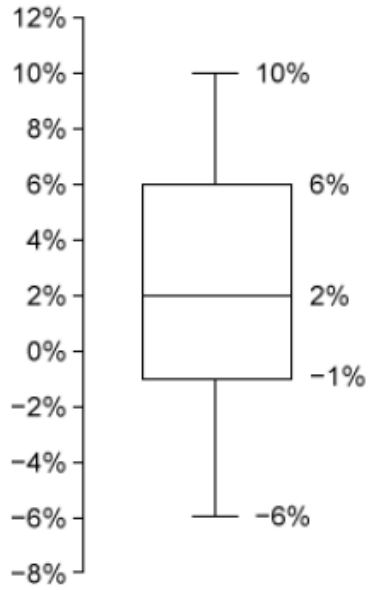
The analyst uses 1.5 times the interquartile range for the whiskers and considers all values beyond the upper and lower fences as outliers. Outliers are *best* described as observed values:
A. above 14% and below −4%
B. above 15% and below −3%
C. above 17% and below −7%

Question 23
A distribution of sample stock returns has the following statistics:

Arithmetic mean	0.45
Standard deviation	0.67
Skewness	0.0
Excess kurtosis	0.83

Compared with a normal distribution, this distribution will *most likely* have extreme returns that occur:
A. less frequently.
B. with the same frequency.
C. more frequently.

Question 24
An analyst collects a portfolio's stock returns from last year and plots them on the following box-and-whisker plot:



The interquartile range is *closest* to:
A. 3.5%
B. 4.0%
C. 7.0%

Question 25

The annual returns for a mutual fund over the past 12 years are shown in the table below:

Year	1	2	3	4	5	6	7	8	9	10	11	12
Return %	−10.9	3.0	7.0	16.0	−2.8	9.0	3.8	−16.8	10.0	16.1	12.4	1.5

The 7th decile return for this fund is *closest* to:

A. 9.40%

B. 10.24%

C. 10.61%

Question 26

When conducting correlation analysis, the *most appropriate* approach is to exclude:

A. all the outliers.

B. none of the outliers.

C. only outliers that are generated from noise.

Question 27

A portfolio holds the following stocks:

Stock	Return (%)
Stock 1	6.00
Stock 2	5.20
Stock 3	−3.75
Stock 4	4.90
Stock 5	6.85
Stock 6	−0.50
Stock 7	2.25

If an analyst is choosing stocks that are only in the third and fourth quintiles of returns for this portfolio, which of the following stocks is the *least appropriate* choice?

A. Stock 2

B. Stock 4

C. Stock 7

Question 28

An otherwise normal distribution with a mean of 0 has an excess kurtosis of −0.6. Which of the following *best* describes the distribution?

A. Its mean will be smaller than its median
B. Its tails will be thinner than a normal distribution
C. It is more likely to have negative values than positive values

Question 29
Assuming assets have a unimodal return distribution, which of the following assets would be most appropriate for an investor aiming to maximize mean returns? An asset with an expected return distribution that is:
A. symmetrical.
B. positively skewed.
C. negatively skewed.

Question 30
An analyst gathers 20X7 annual returns of all 16 stocks in a portfolio. The analyst sorts them from lowest to highest and categorizes them into 4 different groups based on the size of the annual return:

Annual stock returns in 20X7			
Group 1	**Group 2**	**Group 3**	**Group 4**
−6.2%	−2.3%	6.3%	12.2%
−5.7%	−1.6%	8.8%	14.0%
−3.6%	3.4%	11.5%	15.7%
−3.5%	4.2%	11.6%	16.2%

The 75th percentile return for all 16 stocks in the portfolio is *closest* to:
A. 11.90%
B. 12.05%
C. 12.20%

Question 31
A set of stocks in a portfolio had the following returns last year:

Stock	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Return	4.7%	9.7%	−8.3%	6.8%	12.1%	0.9%	−2.6%	18.7%	5.5%	17.2%

A manager wants to adjust the portfolio's strategy and review the stocks in the second quartile of returns. Which stock would be among those that the manager will *most likely* review?

A. Stock 1
B. Stock 4
C. Stock 7

Question 32
The correlation of three portfolios' daily stock returns over the past decade is presented in the following matrix:

	Portfolio 1	Portfolio 2	Portfolio 3
Portfolio 1	1.00	0.83	−0.77
Portfolio 2		1.00	0.13
Portfolio 3			1.00

Based on only this information, which two portfolios *most likely* demonstrated the weakest linear relationship?
A. Portfolios 1 and 2
B. Portfolios 1 and 3
C. Portfolios 2 and 3

Question 33
If a unimodal distribution has a skewness of 0.8, which of the following measures of central tendency is the *greatest*?
A. mode.
B. median.
C. arithmetic mean.

Question 34
A financial advisor grouped returns on asset classes in the following table:

	Portfolio Weighting (%)	Asset Class Return (%)
Domestic Stocks	40.0	7.0
International Stocks	15.0	14.0
Corporate Bonds	35.0	−4.0
Cash and Cash Equivalents	10.0	1.0

The portfolio's return is *closest* to:
A. 3.6%
B. 4.5%
C. 5.0%

Question 35

An analyst calculates the mean and standard deviation for two companies over the same 7-year period:

- Company A: Mean is 9% and standard deviation is 20%.
- Company B: Mean is 14% and standard deviation is 30%.

The *most appropriate* measure for determining which company offers less relative volatility is:

A. F-test.

B. semideviation.

C. coefficient of variation.

Question 36

The annual returns for three funds over a nine-year period are listed in the following table:

	Annual Returns (%)								
Fund 1	−12.3	−10.4	−3.7	1.8	3.9	4.3	7.1	8.6	9.9
Fund 2	−8.4	-6.5	−4.9	−1.2	1.1	5.3	6.5	8.9	10.7
Fund 3	−18.0	−13.9	−8.7	−2.3	3.4	5.7	6.2	13.3	15.8

The fund that had the highest 67th percentile of returns is *most likely*:

A. Fund 1

B. Fund 2

C. Fund 3

Question 37

The monthly returns of a mutual fund for the first six months of 20X0 are given below:

Month	1	2	3	4	5	6
Return %	3.1	−1.1	0.7	2.5	−1.0	1.8

If the sample standard deviation for this fund over the period is approximately 1.77%, the *most appropriate* conclusion is that the fund's sample semideviation for the same period is:

A. less than the standard deviation.

B. equal to the standard deviation.

C. greater than the standard deviation.