1.08 Hypothesis Testing

Question 1
An automotive industry analyst uses a linear regression to test the relationship between gas prices (in USD/gallon) and vehicle sales (in millions of units). Selected data is presented below:

	Coefficients	Standard Error
Intercept	2.060	0.273
Gas Price	(0.323)	0.128

If critical *t*-values are 2.10 at a 5% significance level, then based only on this data, the analyst's *most appropriate* conclusion is that:
A. average monthly vehicle sales are 2.060 million.
B. changes in gas prices explain changes in vehicle sales.
C. the slope of the linear regression line is not significantly different from zero.

Question 2
Which of the following characteristics of point estimates and confidence intervals is *most likely* correct?
A. A point estimate has a sampling distribution.
B. The standard error is required to calculate a point estimate.
C. A confidence interval widens as the confidence level increases.

Question 3
A company's management is concerned that the company might be paying its suppliers earlier than its historical average of 32 days. A recent sample of 70 invoices shows that it took, on average, 28 days to pay suppliers, with a standard deviation of 3 days. Which of the following is the *most appropriate* formulation of the null hypothesis for testing management's concern?
A. Average payment time is less than 32 days.
B. Average payment time is greater than 32 days.
C. Average payment time is greater than or equal to 32 days.

Question 4
A retailer generates higher revenues in the months it runs sales campaigns. An investor runs a linear regression in which the retailer's monthly sales are the dependent variable and an indicator (dummy) variable is the independent variable. The indicator variable takes on a value of 1 in the months with sales campaigns and a value of 0 in the other months. The intercept in this regression is *most appropriately* interpreted as the:
A. mean monthly revenues in the months with sales campaigns.
B. mean monthly revenues in the months without sales campaigns.
C. difference in revenues between months with and without sales campaigns.

Question 5

An analyst performs hypothesis testing on a normal distribution. If the distribution's *p*-value is 0.01, *most likely*:

A. there is a 1% probability of a Type II error.
B. the null hypothesis can be rejected at the 95% confidence level.
C. for a two-tailed test, the null rejection point is approximately 2.33 standard deviations from the mean.

Question 6

An analyst runs a regression with 30 observations, producing the following regression model: $Y = 0.53 + 0.85 X + e$. The analyst wants to test, at a 5% significance level, if Y will change by more than 0.50 for each one-unit change of *X*. Additional data that the analyst needs to perform this test is *most likely* the:

A. *F*-statistic.
B. standard error of the forecast.
C. standard error of the slope coefficient.

Question 7

All else equal, a smaller *p*-value implies that:

A. there is stronger evidence for rejecting the null hypothesis.
B. there is stronger evidence for supporting the null hypothesis.
C. the sample estimate is closer to the hypothesized population parameter.

Question 8

When testing a hypothesis that concerns a sample mean, it is most appropriate to use a nonparametric (rather than parametric) test if the sample size is large and:

A. the population data are ranked.
B. the population variance is unknown.
C. the population is non-normally distributed.

Question 9

The level of significance (α) of a hypothesis test directly specifies:

A. the power of the test.
B. the probability of a Type I error.
C. the probability of a Type II error.

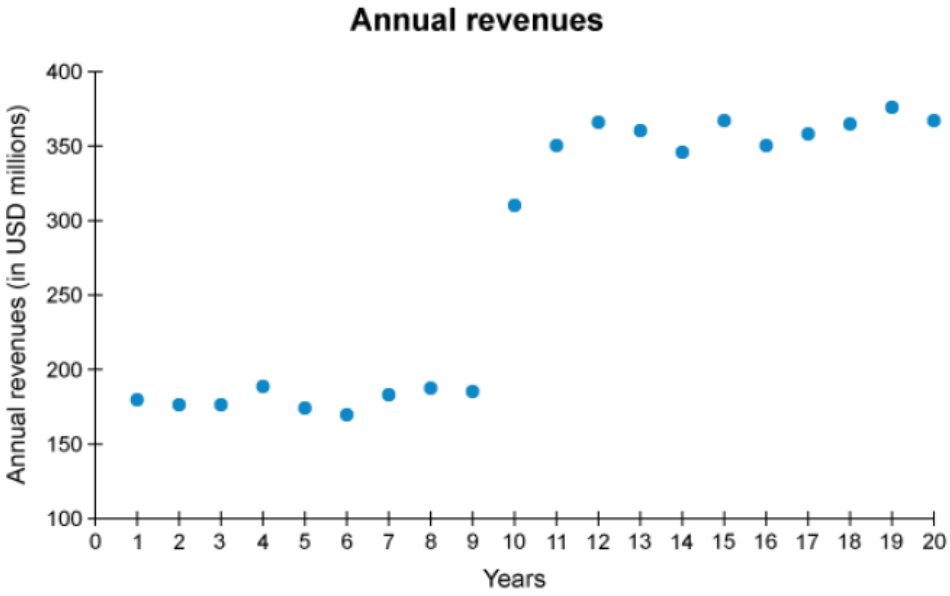
Question 10

The *z*-statistic calculated for a sample mean is 2.50. An analyst performs a hypothesis test on the sample at the 0.05 significance level and does not reject the null hypothesis. The analyst most likely makes a:

A. Type I error.
B. Type II error.
C. correct decision.

Question 11

A company releases a new product at the beginning of Year 10, significantly increasing its revenues as shown:



An investor wants to understand this shift and runs a simple linear regression (SLR) with an indicator (dummy) variable that takes on the value 0 for the years before the product release and 1 for the years following the release. The sum of the slope and the intercept of the SLR is *best* described as the average:

A. annual revenue after the product release.
B. annual revenue before the product release.
C. increase in revenues after the product release.

Question 12

As the significance level of a hypothesis test increases, the most likely outcome is a decrease in the probability of:

A. a Type I error.
B. a Type II error.
C. both a Type I and a Type II error.

Question 13

A consultant formulates a hypothesis to test whether the standard deviation of monthly returns for a portfolio has been less than 6% since inception. After statistical testing, the consultant makes the statistically correct decision to reject the null hypothesis if the actual standard deviation of monthly returns for the portfolio is:

A. less than 6%.
B. equal to 6%.
C. greater than 6%.

Question 14

A nonparametric test can be *most appropriately* applied to which of the following?

A. A chi-square test concerning a single variance

B. A paired comparison test concerning two means

C. A Spearman's rank correlation coefficient test

Question 15

An analyst conducts two hypothesis tests using different samples. The null and alternative hypotheses are the same for each test:

H_0 : population mean is less than or equal to zero

H_1 : population mean is greater than zero

The tests are at the 0.05 significance level, and the critical value is 1.685. In Test 1, the value of the test statistic is 1.745, and in Test 2 the *p*-value is 0.0027. Assume that the probability of an outcome less than 1.745 is 95.95%. Test 2's evidence to reject the null hypothesis is *most likely*:

A. weaker than Test 1's evidence.

B. the same as Test 1's evidence.

C. stronger than Test 1's evidence.

Question 16

An analyst runs a linear regression between the prices of Stock A and Stock B, with 24 observations, resulting in the following coefficients table:

	Coefficients	Standard Error
Intercept	402.314	29.689
Stock A	(1.339)	0.332

The coefficient of determination (R^2) of this regression is 0.425 and the critical t-value at a 5% significance level is ±2.074. The *most appropriate* conclusion about the correlation of the stocks is that there is:

A. sufficient evidence that the stocks are positively correlated.

B. sufficient evidence that the stocks are negatively correlated.

C. not sufficient evidence that the stocks are positively or negatively correlated.

Question 17

An analyst is testing the returns generated by a portfolio manager. The mean return from samples drawn by the analyst was 5%, but the analyst suspects that the manager's actual returns are 4%. After applying a hypothesis test, the analyst rejects the null hypothesis. The analyst's *most appropriate* conclusion is that the manager's mean return is:

A. equal to 4%.

B. not equal to 4%.

C. not equal to 5%.

Question 18
An analyst tests a hypothesis concerning the ranking of the top three portfolio managers this year. If the underlying data are purely ordinal and no return performance data are available, which type of test is most appropriate?
A. Parametric only
B. Nonparametric only
C. Either parametric or nonparametric

Question 19
An analyst wants to measure a mutual fund's performance and volatility against a benchmark and runs a regression where the benchmark is the single independent variable. Selected data for the regression, based on 12 observations, is:

	Coefficients	Standard Error
Intercept	0.127	0.022
Benchmark	1.055	0.026

The analyst tests whether the intercept is greater than 0.10 and whether the slope is greater than 1.00. If the critical t-values, with 5% significance, are 2.228 (two-sided) and 1.812 (one-sided), the data *most likely* supports the hypothesis(es) that:
A. the intercept is greater than 0.10, and the slope is greater than 1.00.
B. the intercept is greater than 0.10, but the slope is not greater than 1.00.
C. the intercept is not greater than 0.10, but the slope is greater than 1.00.

Question 20
A researcher formulates a null hypothesis stating that a country's average inflation is 2%. After testing a sample, the researcher fails to reject the null hypothesis when the actual average inflation is not 2%. This *most likely* results in a:
A. Type I error.
B. Type II error.
C. correct decision.

Question 21
An analyst has created a regression to verify whether the return on a company's stock is related to its reported free cash flow (FCF) over the prior 30 quarters. Information from the regression is:

Regression Output	Coefficient	Standard Error	*t*-statistic
Intercept	37.743	6.745	5.596
FCF	0.085	0.046	1.859

ANOVA Output	df	Sum of Squares (SS)	Mean Square (MS)
Regression	1	961.01	961.01
Residual	28	7,784.86	278.03
Total	29	8,745.87	

The analyst tests the FCF slope coefficient at a 5% level of significance (α). If the critical *t*-values at the 5% level of significance are

- 1.701 for a one-tailed test and
- 2.048 for a two-tailed test,

then the most appropriate null hypothesis and conclusion regarding the FCF slope coefficient is:
A. H_0 : FCF ≠ 0; reject the null hypothesis.
B. H_0 : FCF = 0; reject the null hypothesis.
C. H_0 : FCF = 0; cannot reject the null hypothesis.

Question 22
A global investment firm claims that its average annual returns exceed 20%. A consultant tests that claim by sampling 20 years of available annual returns. The sample's mean annual return is 24% with a standard deviation of 10%. If the firm's returns are normally distributed, then the rejection point for the null hypothesis at a 0.05 level of significance is *closest* to:
A. 1.729
B. 1.789
C. 2.093

Question 23
In contrast to a confidence interval, a point estimate refers to a:
A. specific value.
B. range of values.
C. more accurate estimate.

Question 24
An analyst finds that there is significant statistical evidence to suggest that return premiums in the emerging market of Country Y are greater than those of Country X. To finalize an investment decision, the analyst should *most appropriately*:
A. based only on the statistical evidence, invest in Country Y.
B. also consider economic factors before making an investment in Country Y.
C. ignore the statistical evidence and consider economic factors in Country Y.

Question 25

A researcher's null hypothesis states that a firm's average annual returns are 20%. After calculating the test statistic, the researcher rejects the null hypothesis when the firm's average annual returns are indeed 20%. This *most likely* results in a:

A. Type I error.
B. Type II error.
C. correct decision.

Question 26

In hypothesis testing, an increase to the power of the test *most likely* increases the probability of:

A. not making a Type I error.
B. not making a Type II error.
C. calculating an accurate test statistic.