Multiple choice questions

1. What is a typical sign of survivorship bias?
    A. Highlighting failures while ignoring successes
    B. Focusing on successful outcomes while ignoring failures
    C. Presenting data without charts
    D. Using only recent data
2. Why is recognizing causation versus correlation critical?
    A. To reduce sampling bias
    B. To avoid false conclusions from spurious relationships
    C. To increase statistical significance
    D. To remove outliers
3. Which question is NOT part of critical evaluation in data collection?
    A. Who collected the data?
    B. How was the data gathered?
    C. Is the data published in a book?
    D. Are there blind spots?
4. What is the risk of using convenience sampling?
    A. Increased randomization
    B. High potential for bias and limited generalizability
    C. Overrepresentation of minorities
    D. Reduced bias
5. Why can summary statistics like the mean be misleading?
    A. They provide accurate trends
    B. They are always better than the median
    C. They can be skewed by outliers
    D. They account for variability
6. Which scenario demonstrates the use of misleading axes in graphs?
    A. Omitting the baseline to exaggerate differences
    B. Highlighting equal data points
    C. Using consistent chart types
    D. Avoiding truncation
7. Which type of sampling minimizes bias?
    A. Convenience sampling
    B. Systematic sampling
    C. Random sampling
    D. Response-based sampling
8. Why is $p < 0.05$ commonly used?
    A. It represents a mathematical threshold

B. It minimizes bias in statistical results

C. It's a standard for statistical significance, but arbitrary

D. It ensures causation

9. How does cherry-picking data mislead analysis?

A. It increases sample sizes

B. It uses only favorable results to support a claim

C. It relies on randomization

D. It reduces variability

10. What is an appropriate method to isolate causation in e.g. management research?

A. Use correlation analysis

B. Randomized controlled experiments

C. Compare yearly trends

D. Collect larger samples

11. What is the main flaw of statistical significance?

A. It accounts for bias

B. It ignores practical importance

C. It removes outliers

D. It prevents false positives

12. What is the purpose of Bayes' Theorem?

A. To prove correlation

B. To update probabilities based on new evidence

C. To measure statistical significance

D. To remove confounding variables

13. What is a common misinterpretation of p-values?

A. They prove causation

B. They indicate the likelihood of the null hypothesis being false

C. They show the likelihood of observed results assuming the null hypothesis is true

D. They measure variability

14. What is the primary risk of overfitting in big data?

A. Enhanced generalization

B. Poor prediction accuracy on new data

C. Reduced data complexity

D. Increased sample bias

15. What does "practical significance" consider that "statistical significance" may ignore?

A. P-values

B. Real-world impact

C. Data generalizability

D. Randomization

16. What is the primary problem with p-hacking?

A. It finds causal relationships

B. It reduces outliers

C. It produces false positives through repeated testing

D. It uses fixed hypotheses

17. Why is context important in big data analytics?

A. It reduces the sample size

B. It ensures meaningful interpretation of results

C. It increases generalization

D. It eliminates bias

18. Why do large datasets amplify risks of false positives?

A. Small effects might become statistically significant

B. Large effects always generalize

C. Statistical models become unbiased

D. Randomization decreases

19. How can algorithmic bias occur in AI?

A. Through fair data sampling

B. By including discriminatory data in training sets

C. By ignoring small sample sizes

D. Through consistent transparency

20. What should you do to critically evaluate research transparency?

A. Examine sample size and justification

B. Avoid reporting covariates

C. Ignore failed manipulations

D. Focus solely on p-values

21. Which of the time series listed below can be used to estimate Total Factor Productivity:

A. Sum of Total Imports And Exports

B. Total Imports

C. Gross International Product

D. Gross National Product

22. Consider a Cobb-Douglas production function $Y = AK^{\alpha}L^{1-\alpha}$. Which of the following statements is true?

A. Marginal returns to both capital and labor are constant

B. Total factor productivity (TFP) has no impact on output per worker

C. The production function exhibits constant returns to scale

D. The elasticity of output with respect to capital is always greater than one

23. In an endogenous growth model with the production function $Y = AK$, where A is constant and there is no labor input, what is the implication for long-run growth?

A. Growth converges to zero due to diminishing returns

B. Capital accumulation leads to sustained growth

C. Growth depends only on population growth

D. There is no growth in the long run

24. If the production function is $Y = AK^{\alpha}L^{1-\alpha}$, what is the elasticity of output with respect to labor?

A. α

B. $1 - \alpha$

C. A

D. $\frac{L}{Y}\frac{\partial Y}{\partial L} = \alpha$

25. For $Y = AK^{\alpha}L^{1-\alpha}$, which of the following statements is true about the returns to scale?

A. If you double both K and L, output more than doubles

B. Output increases less than proportionally when inputs are doubled

C. The function has constant returns to scale

D. The returns to scale depend on the level of A

26. Consider the production function $Y = AK^{\alpha}L^{1-\alpha}$. Which condition ensures strict concavity of the function in inputs K and L?

A. $\alpha > 1$

B. $0 < \alpha < 1$

C. $\alpha = 1$

D. $\alpha < 0$

27. Given the Cobb-Douglas function $Y = AK^{\alpha}L^{1-\alpha}$, the Solow residual is interpreted as:

A. The marginal product of capital

B. Growth in labor efficiency

C. Total factor productivity

D. Capital intensity in the economy

28. In macroeconomics, the business cycle refers to …

A. Fluctuations in the general price level.

B. Fluctuations in the level of output.

C. Fluctuations in inflationary expectations.

D. Fluctuations in government expenditures.

29. If the central bank of a country decides to reduce the short-term interest rates, this likely means that…

A. The economy is booming, and the central bank is trying to cool it down.

B. The central bank is worried about the value of the domestic currency and wants to boost it.

C. The central bank is worried about an imminent recession and wants to boost output.

D. The central bank is worried about inflation and wants to stop it.

30. The exchange rate between the domestic and a foreign currency is determined by…

A. The relative tax rates of the countries involved.

B. The monetary strength of the countries involved.

C. The law of supply and demand.

D. The political regime of the countries involved.

31. Which of the following is not different between the Solow and Malthus models?

A. Population growth is exogenous.

B. The production function has decreasing marginal returns.

C. There is capital accumulation.

D. Households save.

32. The marginal product of a factor of production

A. is equal to the ratio of the amount of that factor of production to the amount of output produced.

B. is equal to the amount of additional output that can be produced with one additional unit of each factor input.

C. is equal to the amount of additional output that can be produced with one additional unit of that factor input, holding constant the quantities of the other factor inputs.

D. always exceeds the average product of that factor input, holding constant the quantities of the other factor inputs.

33. Which of the following is not a characteristic of a perfectly competitive industry?

A. The industry consists of many small firms producing similar products.

B. There is no government intervention in the industry.

C. Producers set the price of the products freely.

D. Economic profit is driven to almost zero due to competition.

34. Two points on the same indifference curve represent the same…

A. Price level

B. Income level

C. Capital level

D. Utility level

35. Elasticity in economics is:

A. A term that is used to describe the degree of flexibility in wages.

B. A measure of responsiveness.

C. A relative difference in price and marginal cost.

D. An index used to measure market competitiveness.

36. For a rational consumer who has to choose between two goods in the context of budget constraints, the price change of one of the goods, ceteris paribus, will determine:

A. A parallel shift of the budget line to the left.

B. A change in the slope of the budget line.

C. No change in the budget line.

D. A parallel shift of budget line to the right.

37. Which of the following statements are false?

A. Information, the entrepreneur's ability, technical progress are neo-factors of production.

B. According to the stages of the circular flow of the company's capital, it takes three forms: money, capital goods and commodity.

C. Fixed capital depreciation is only due to physical deterioration.

D. The factors of production are resources attracted and used in economic activity.

38. Which of the following can cause the usual OLS t statistics to be invalid (that is, not to have t distributions under H0)?

A. Heteroskedasticity.

B. A sample correlation coefficient of 0.95 between two independent variables that are in the model.

C. Omitting an important explanatory variable.

Open ended questions

Part A

1. In a competitive market economy, explain how the market (price) mechanism allocates resources in the input and output markets efficiently.
2. What is the difference between a change in demand and a change in quantity demanded?
3. What are normal goods and inferior goods?
4. Identify the most important factor shifting the AS curve in the long term. Briefly explain both how and why this factor shifts the aggregate supply curve.
5. Define zero elasticity and describe the resultant demand curve.
6. Contrast the role of fixed costs and variable costs in economic decisions about future production and pricing.
7. How does a price ceiling set below the equilibrium level affect quantity demanded and quantity supplied?
8. Explain the concept of “moral hazard” in Economics.
9. What is self-selection and how might it be addressed in economic research?
10. Why do economists use mathematic models?
11. Explain the difference between correlation and causation in your own words.
12. List and explain Gauss-Markov assumptions.
13. Explain what is heteroskedasticity and how the problem of heteroskedasticity might be resolved.
14. Which measures of goodness of fit for the regression models do you know? Discuss their appropriateness for specific models.
15. What is the model misspecification and how could it be resolved?
16. What is consistency of OLS model?

Part B

Assignment 1

Weekly wages are known to be normally distributed with a standard deviation of £5.10. An economist claims that the mean weekly income in this industry is £70.40. A random sample of 35 workers yields a mean income of £75.20.

a) What null and alternative hypothesis would you specify?

b) Generate a 95% confidence interval for the sample mean.

c) Use a classical hypothesis test at the 5% level of significance to test the null hypothesis.

Assignment 2

You are a member of a team of scientific advisors considering whether genetic modification of crops has any health consequences for the population. You set up the issue as one of hypothesis testing:

a) What would be your null and alternative hypothesis

b) Explain what Type I and Type II errors are in this context

c) Outline the costs involved in making Type I and Type II errors

Assignment 3

The variable smokes is a binary variable equal to one if a person smokes, and zero otherwise. Using the data on 807 individuals on 10 variables:

- educ: years of schooling

- cigpric: state cig. price, cents/pack

- white: =1 if white

- age: in years

- income: annual income, $

- cigs: cigs. smoked per day

- restaurn: =1 if the person lives in a state with restaurant smoking restrictions, the following equation is estimated:

$$\widehat{smokes} = .656 - .069 \log(cigpric) + .012 \log(income) - .029\ educ$$
$$(.855)\ \ (.204) \qquad (.026) \qquad (.006)$$
$$[.856]\ \ [.207] \qquad [.026] \qquad [.006]$$
$$+ .020\ age - .00026\ age^2 - .101\ restaurn - .026\ white$$
$$(.006) \qquad (.00006) \qquad (.039) \qquad (.052)$$
$$[.005] \qquad [.00006] \qquad [.038] \qquad [.050]$$
$$n = 807,\ R^2 = .062.$$

Both the usual and heteroskedasticity robust standard errors are reported.

a) Are there any important differences between the two sets of standard errors?

b) Holding other factors fixed, if education increases by four years, what happens to the estimated probability of smoking?

c) At what point does another year of age reduce the probability of smoking?

d) Interpret the coefficient on the binary variable restaurn.

Assignment 4

Consider an equation to explain salaries of CEOs in terms of annual firm sales, return on equity (roe, in percent form), and return on the firm's stock (roe, in percent form):

$$\widehat{\log(salary)} = \underset{(0.32)}{4.32} + \underset{(.035)}{.280}\ \log(sales) + \underset{(.0041)}{.0174}\ roe + \underset{(.00054)}{.00024}\ ros$$
$$n = 209,\ R^2 = .283$$

a) By what percent is salary predicted to increase, if ros increases by 50 points? Does ros have a practically large effect on salary?

b) Test the null hypothesis that ros has no effect on salary, against the alternative that ros has a positive effect. Carry out the test at the 10% significance level.

c) Would you include ros in a final model explaining CEO compensation in terms of firm performance? Explain