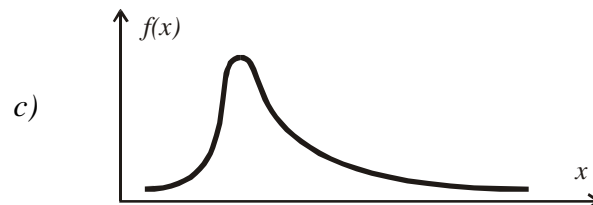
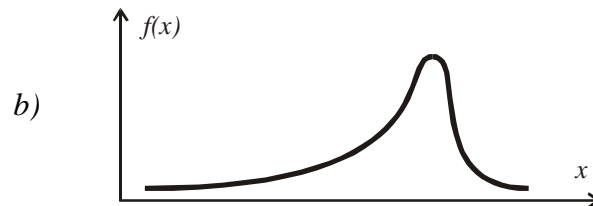
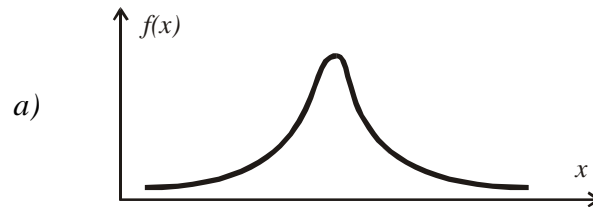


Name: _____

Question 1

4 points

Which of the distributions represented below is most likely to have a median value that is greater than the mean value? (Choose only one !)

Answer

Question 2

4 points

You are weighing a sample of parts to test the hypothesis that the mean value of the part weight is 22.4 pounds. The data from the sample lead you to reject this hypothesis. A more thorough examination of the part population reveals that the mean part weight is, in fact 22.4 pounds. Would the error of your initial conclusion be classified as a **Type I** or **Type II** error?

Answer

Question 3

6 points

The following are properties of a valid pdf (probability density function) $p(x)$:

Circle true or false for *each* statement.

- | | | |
|------|-------|---|
| True | False | The pdf must be ≥ 0 for all x . |
| True | False | The pdf must be monotonically increasing. |
| True | False | The integral of the pdf from $-\infty$ to $+\infty$ is 1. |

Question 4

6 points

Two measures of the surface finish (roughness) of a part are R_a and R_q . Describe the difference in the calculation of these parameters. You do not have to show any equations, but you can if you like.

Question 5
15 points

A discrete random variable can have the value of 1, 2, 3, or 4 with the following probabilities:

$$P(x=1) = 0.15$$

$$P(x=2) = 0.42$$

$$P(x=3) = 0.20$$

$$P(x=4) = 0.23$$

Find the mean (μ) and the variance (σ^2) of the random variable x

Question 6

15 points

The data in the table below are obtained by measurement.

15.977	16.118	15.672	15.345	15.072
15.526	15.074	14.983	16.246	16.754

a) Calculate the median (\tilde{x}) and Interquartile range (IQR) of the data.

b) calculate the sample mean (\bar{x}) and the sample variance (S^2).

NOTE: for full credit, write the formulas you use, and show the values obtained.

Question 7
10 points

Assuming that the data from question 6 are from a normal distribution, calculate the 95% two-sided confidence interval for the true mean of the distribution.

Question 8

15 points

In order to pass a safety requirement, the mean brake disk thickness from the manufacturing process must not be less than **1.040** inches. To test for compliance, 40 brake disks are taken from a production run and their thickness is measured. The process is well understood, and the variance (*remember, variance = σ^2 !*) is "known" to be **0.004** inches. The results of these measurements give a sample average of **1.064** inches.

Test the hypothesis that the mean thickness is 1.040 inches versus the alternative that the mean thickness exceeds (is greater than) 1.040 inches. Use $\alpha = 0.05$. Clearly state the conclusion you draw.

