

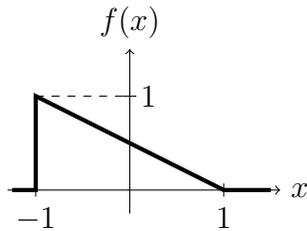
STAT100 Elementary Statistics and Probability

Exam 2, Monday, August 11, 2014

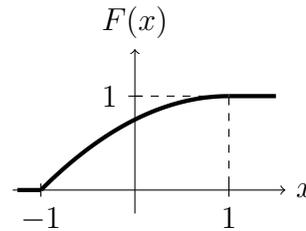
Name: _____

Show all work clearly and in order, and circle your final answers. Justify your answers algebraically whenever possible. Calculators are allowed in this exam for basic calculation only. You have 80 minutes to take this 104 point exam. If you get more than 100 points, your grade will be 100.

- (18 points) Suppose the weights of the contents of cans of mixed nuts have a normal distribution with mean 32.4 ounces and a standard deviation of .4 ounce.
 - (6 points) If every can is labeled 32 ounces, what proportion of the cans have contents that weight less than the labeled amount?
 - (6 points) If 10 packages are randomly selected, what is the probability that the average weight is less than 32 ounces?
 - (6 points) How many packages has to be randomly selected to be 90% sure that the error margin (between the average weight and 32.4 ounce) does not exceed .1?
- (20 points) A continuous random variable X has the following probability density function f and cumulative distribution function F .



$$f(x) = \begin{cases} \frac{1-x}{2} & -1 \leq x \leq 1 \\ 0 & \text{otherwise} \end{cases}$$



$$F(x) = \begin{cases} 0 & x \leq -1 \\ \frac{-x^2 + 2x + 3}{4} & -1 \leq x \leq 1 \\ 1 & x \geq 1 \end{cases}$$

- (5 points) Which of the two intervals $[-1 < X < 0]$ or $[0 < X < 1]$ is assigned a higher probability?
 - (5 points) Compute $P(|X| \leq .4)$.
 - (5 points) Determine the third quartile of X .
 - (5 points) Is X left-skewed, right-skewed or symmetric?
- (24 points)
 - (6 points) Φ is the cumulative distribution function of standard normal distribution. Find $\Phi(.587)$ and $\Phi(1.032)$. Use the normal table and linear interpolation to get your answer. (Round up to 4 digits)

- (b) (5 points) Suppose Z is a random variable with standard normal distribution. Find $P(Z \leq .587 \text{ or } Z \geq 1.032)$.
- (c) (6 points) Suppose X has a normal distribution with mean -1.619 and standard deviation 2 . Find $P(|X| > .445)$.
- (d) (7 points) [*] Find the 70th quartile of standard normal distribution with cumulative distribution function Φ . Use the normal table and linear interpolation to get your answer. (Round up to 4 digits)
4. (20 points)
- (a) (10 points) Last year, 75% of UMD students read the Diamondback. In a group of 1200 randomly selected students, what is the approximate probability that fewer than or equal to 880 students read the Diamondback?
- (b) (10 points) To determine if this percentage has changed, a random sample of 300 students is studied and 246 read the Diamondback. Does this finding indicate that the current percentage of students reading the Diamondback has changed from what it was last year? (Form the testing hypotheses, compute the P -value and determine if the percentage has changed or not based on the data.)
5. (22 points) A manager at a power company monitored the employee time required to process high-efficiency lamp bulb rebates. A random sample of 40 applicants gave a sample mean time of 3.8 minutes and a standard deviation of 1.2 minutes.
- (a) (8 points) Calculate a 95% confidence interval for the population mean time μ .
- (b) (10 points) Is the claim that $\mu > 3.5$ minutes substantiated by these data? Test with level of significance $\alpha = .1$.
- (c) (4 points) Based on your decision in Part (b), what error could you have possibly made? Explain in the context of the problem.