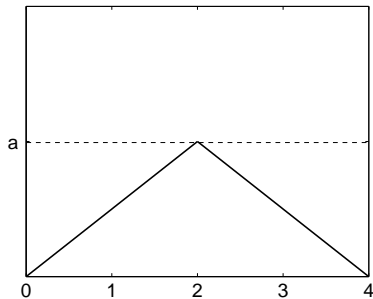
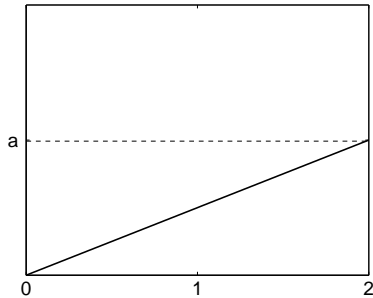
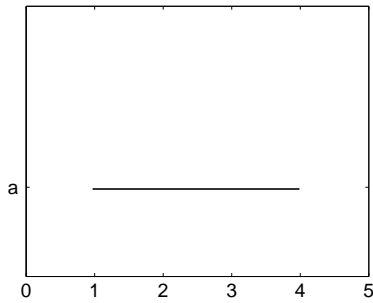


MATH 111, Test 2, April 5, 2006

1. Let $x \sim \text{unif}[0,1]$. Find the distribution of **(a)** $2x$ **(b)** $x - 1$ **(c)** $2x + 9$ **(d)** $x/3$.

2. Let $x \sim \text{unif}[4,10]$. Find **(a)** $P(x \leq 8)$ **(b)** $P(x > 6)$ **(c)** $P(x < 11)$ **(e)** $P(|x - 6| < 1)$ **(f)** the mean μ and the standard deviation σ of x .

3. Each graph below is the pdf of some continuous random variable x . In each, find **(a)** the value of the constant a **(b)** $P(x \leq 1)$.



4. Let $x \sim N(3,1)$. Find **(a)** $P(x \leq 4)$ **(b)** $P(x \leq 2)$ **(c)** $P(x > 3.5)$ **(d)** $P(2 \leq x \leq 5)$ **(e)** $P(|x - 3| > 0.8)$.

5. Let $x \sim N(\mu, \sigma^2)$. It is known that $P(x \leq 10) = P(x > 6) = 0.841$. What are μ and σ^2 ?

6. You have 9 observations from a normal distribution with unknown mean μ . The sample mean is $\bar{x} = 12.2$. Find a 95% confidence interval for μ if (a) $\sigma = 5$ (b) σ is unknown and the sample variance is $s^2 = 36.0$.

7. It is said about the French mathematician Henri Poincaré that he bought a loaf of bread every day from his local baker. The loaves were supposed to weigh one kilogram (=1,000 grams) and Poincaré carefully weighed each loaf that he bought. After he had weighed one hundred loaves, he plotted the weights and decided that they followed a normal distribution. His sample mean was 950 and his sample standard deviation was 150. Poincaré concluded that the baker was cheating.

(a) Find a 99% confidence interval for the unknown mean weight μ (since n is so large, you can assume that $\sigma = 150$). Does your interval support Poincaré's conclusion?

(b) After Poincaré had complained, his next one hundred loaves turned out to weigh on average a kilogram. However, after he had plotted his weights he concluded that the baker was still cheating his customers. Below is a histogram over Poincaré's one hundred loaves. How was the baker still cheating?

(c) I don't know if the story is true. Do you think so?

