

- 1 Alice is waiting for a Circle Link shuttle bus (a “greenie”). Her experience is that she waits an average of 10 minutes for each bus. She is a Math 126 student, so she models her waiting time as an exponential random variable.
- (a) What is the probability (under this model) that Alice waits 5 minutes or less for a bus?
 - (b) Suppose Alice has an exam this morning. She’ll make it to the exam on time if the bus arrives within 20 minutes. What is the probability that Alice is late (that is, **not** on time) to her exam?
- 2 The SACT is a new test for college-bound high school students. It is designed so that scores are normally distributed with a mean of 400 and a standard deviation of 50.
- (a) Find the probability that a randomly selected high school student scores between 300 and 450 on the SACT.
 - (b) Find the probability that a randomly selected high school student scores over 500 on the SACT.
 - (c) A college wants to be selective and so only decides to accept only students who score in the top 6% on the SACT. What is the lowest score on the test that this college should consider? (Please round your answer to the nearest multiple of 10.)
- 3 Find the value, if any, of each of the following improper integrals. Justify your answers using limits!
- (a) $\int_0^{\infty} 12e^{-4x} dx$
 - (b) $\int_1^5 \frac{1}{(x-1)^2} dx$
- 4 (a) Find k , if possible, so that $f(x) = k(10x - x^2)$ is a probability density function on the interval $0 \leq x \leq 10$. If it is not possible, explain why not.
- (b) Suppose $\{-8, 2, 6, x, y\}$ is a set of population data with $\mu = 1$ and $\sigma^2 = 22.4$. Find x and y .
- 5 Suppose X is a random variable with probability density function $f(x) = \frac{9}{4x^3}$ on the interval $1 \leq x \leq 3$.
- (a) Calculate the probability $P(X \leq 2)$.
 - (b) Calculate the expected value $E(X)$.
 - (c) Calculate the variance $\text{Var}(X)$.