Instructions: Include all relevant work to get full credit.

## Homework 9

- 1. The normal resting heart rate for adults ranges from 60 to 100 beats a minute. But well-trained athlete have a much lower normal resting heart rate. Suppose the pulse rates of well-trained athletes are approximately normally distributed with a mean of 45 beats per minute (bpm) and a standard deviation of 6 bpm.
  - a. What proportion of well-trained athletes has a pulse rate of
    - i. at least 60 bpm? Sketch an appropriate density curve and shade the area under the curve that corresponds to this question.
    - ii. between 50 bpm and 60 bpm?
  - **b.** What is the minimum pulse rate of those well-trained athletes in the upper extreme 2.5%?
- 2. Wires manufactured for use in a computer system are specified to have resistances between 0.12 and 0.14 ohms. The actual measured resistances of the wires produced by company A have a normal probability distribution with mean 0.13 ohm and standard deviation of 0.005 ohm.
  - a. What is the probability that a randomly selected wire from company A's production will meet the specification?
  - **b.** If five of these wires are used in each computer system and all are selected from company A, what is the probability that at least one of the five wires in a randomly selected system will not meet the specifications?
- **3.** If  $Y \sim N(\mu, \sigma^2)$ , show that the maximum value of the normal density is  $1/(\sigma\sqrt{2\pi})$ , and occurs when  $y = \mu$ . Again, don't forget to check that you get a maximum and not a minimum at this critical point.
- 4. Assume that  $Y \sim N(\mu, \sigma^2)$ . After observing a value of Y, a student constructs a rectangle with length L = 3|Y| and width W = 2|Y|. Let A denote the area of the rectangle. Determine the E(A). [Hint: Note that  $|Y|^2 = Y^2$ ]