AMS102: HOMEWORK 9

SOLUTIONS

Chapter 8

8.21. (a) $P(X > 240) = P\left(z > \dfrac{240-170}{30}\right) \approx P(z > 2.33) = 1 - P(z < 2.33) = 1 - 0.9901 = 0.0099$

(b) The mean $\mu = 170$; $n = 4$, so the standard deviation is $30/\sqrt{4} = 15$. $\bar{X}$ is distributed as $N(170, 15)$.

(c) $P(\bar{X} > 190) = P\left(z > \dfrac{190-170}{15}\right) \approx P(z > 1.33) = 1 - P(z < 1.33) = 1 - 0.9082 = 0.0918$

8.23. The mean weight $\bar{X}$ of 9 wrestlers is distributed as $N\left(540, \dfrac{45}{\sqrt{9}}\right) = N(540, 15)$. The elevator will fail if the mean weight for nine people will exceed 5000/9 pounds. $P\left(\bar{X} > \dfrac{5000}{9}\right) \approx P(z > 1.04) = 1 - P(z < 1.04) = 1 - 0.8508 = 0.1482$

8.28. (a) The corn husks are distributed uniformly. Thus the probability that a husk is longer than 13 inches (or, equivalently, that is it between 13 and 16 inches since 16 is the greatest possible length) is $\dfrac{16-13}{16-8} = \dfrac{3}{8} = 0.375$

(b) The mean length is distributed according to $N\left(12, \frac{2.3}{\sqrt{50}}\right) \approx N(12, 0.33)$. The probability $P(\bar{x} > 13) = P\left(z > \frac{13-12}{0.33}\right) \approx P(z > 3) = 1 - P(z < 3) = 1 - 0.9987 = 0.0013$.

(c) Probably not because the sample is relatively small. (The method would work if corn husks were distributed normally to begin with, but they are not.)

Chapter 1

1.5. The answers below work in the situations described in parenthesis. In a different situation the answer may be different as well.

(a) Type I: reject the hypothesis that the gun is loaded when it is (and then refuse to submit to a carjacker...)

(b) Type I: reject the hypothesis that the dog bites when, in fact, it does (and then pet the nice doggie)

(c) Type II: fail to reject the hypothesis that the mall is open when it is actually closed (and then drive there in heave traffic)

(d) Type I: reject the hypothesis that the watch is not waterproof when it is not (and then go swimming with that wonderful new Rolex you got for your birthday)

1.7. (a) H_0: the yield of plants fertilized with Brand B will not be higher than that of plants fertilized with Brand B

H_1: the yield of Brand B-fertilized plants will be higher

(b) Type I: reject H_0 when it is true. That is, to assume that Brand B works better when, in fact, it makes no difference

Type II: fail to reject H_0 when it is false. That is, to assume that the Brand B works no better than Brand A when, in fact, it works better