AMS102: HOMEWORK 8

SOLUTIONS

Chapter 8

8.5. (a) Histogram C. Either the bearings are from the supplier I or from the Supplier II; that is $X = 0$ or 1 and there are no other possible values of the variable. This rules out B and D. Histogram A carries very little meaning since it does not distinguish between the suppliers.

(b) Histogram B. The sampling distribution is approximately normally distributed with values centered at the true proportion $p = 0 \cdot 0.8 + 1 \cdot 0.2 = 0.2$.

8.9. This is a sampling distribution of proportion with the true proporion $p = 0.5$ and the size of sample $n = 400$. The distribution is approximately normal, $N\left(p, \sqrt{\frac{p(1-p)}{n}}\right) = N(0.5, 0.025)$. We need to find $P(\hat{p} < 0.45$. The z-score for 0.45 is $\dfrac{0.45 - 0.5}{0.025} = -2$. The probability is thus $P(z < -2) = 0.028$.

8.10(b). This is a sampling distribution of proprtion with $p = .49$ (the true proportion) and $n = 100$ (the Senate size). The distribution is approximately normal, $N\left(p, \sqrt{\frac{p(1-p)}{n}}\right) \approx N(0.49, 0.05)$. We need to find $P\left(\hat{p} > \dfrac{50}{100}\right) = P(\hat{p} > 0.50) = 1 - P(\hat{p} < 0.50)$. The z-score for 0.50 is $\dfrac{0.50 - 0.49}{0.05} = 2$. $1 - P(z < 2) = 1 - 0.9772 = 0.0228$.

Note that this means that among all possible compositions of the Senate, only 2.28% have men in the majority. There are currently 16 women in the Senate. The only *statistical* conclusion we can draw from this is that the Senate is definitely not chosen randomly.

8.35. This is a sampling distribution of proportion with $p = 0.6$, $n = 100$. The distribution is approximately normal, $N\left(p, \sqrt{\frac{p(1-p)}{n}}\right) \approx N(0.6, 0.05)$. We need to find $P(\hat{p} < 0.5)$. The z-score for 0.5 is $\dfrac{0.5 - 0.6}{0.05} = -2$. $P(z < -2) = 0.0228$. (You may have a slightly different answer depending on what approximation you take for $\sqrt{\frac{p(1-p)}{n}}$.)