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Introduction to Probability
Homework 5

Problem 39

Given that blah blah..

a) Exactly two of the four components last longer than 1000 hours

$$\begin{aligned} p(2) &= \binom{4}{2}(.2^2)(.8^2) \\ &= .1536 \end{aligned}$$

b) The subsystem operates longer than 1000 hours

$$\begin{aligned} p(\text{longer than 1000 hours}) &= 1 - p(\text{less than 1000 hours}) \\ &= 1 - p(3) \\ &= 1 - \binom{4}{3}(.2^3)(.8) \\ &= .9744 \end{aligned}$$

Problem 41

To get at least 10 questions right on the test we must have, $p(y >= 10)$. This can be represented as

$$\begin{aligned} \sum_{x=10}^{15} &= \binom{15}{x}\left(\frac{1}{5}\right)^x\left(\frac{4}{5}\right)^{15-x} \\ &= .0001 \end{aligned}$$

Problem 61

80% of people donating blood have the Rhesus(Rh) factor present.

a) With five people selected, what is the probability that at least one does not have the Rh factor?

$$\begin{aligned} p(\text{at least one does not have Rh}) &= 1 - p(\text{everyone has Rh}) \\ &= 1 - (.8)^5 \\ &= .6723 \end{aligned}$$

b) With five people selected, what is the probability that at most four have the Rh factor?

$$\begin{aligned} p(\text{at most four have the Rh factor}) &= = 1 - p(\text{everyone has Rh}) \\ &= .6723 \end{aligned}$$

c) Using the equation:

$$\begin{aligned}\binom{n}{5}(.8)^5(.2)^{n-5} &= p(y \geq 5) \\ &= .90\end{aligned}$$

Testing each value of n, the first case where $p(y \geq 5) > .90$ is when there are **8** people selected.

Problem 67

Finding a success on 5th try:

$$\begin{aligned}p(5) &= (.7)^4(.3) \\ &= .072\end{aligned}$$

Problem 73

Probability of an error in the audit is **.9**

a) Error is found on the third company:

$$\begin{aligned}p(3) &= (.1)^2(.9) \\ &= .009\end{aligned}$$

b) Error is found on or after the third audit:

$$\begin{aligned}p(y \geq 3) &= 1 - p(y < 3) \\ &= 1 - [p(1) + p(2)] \\ &= 1 - [.9 + (.01)(.90)] \\ &= 1 - .99 \\ &= .01\end{aligned}$$