

Instructions: Include all relevant work to get full credit.

Homework 1

1. If 3 English, 4 Mathematics, and 5 History textbooks are randomly placed on a display shelf, what is the probability that all the Mathematics books are together? Round your final answer to 4 decimal places.

$$\frac{9!(4!)}{12!} \approx 0.0182$$

2. How many nonnegative integer solutions are there for the equation, $x + y + z = 10$? [Hint: Example solutions are: $(x = 2, y = 3, z = 5)$ or $(x = 4, y = 0, z = 6)$.]

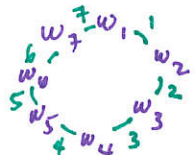
$$00|000|00000 \Rightarrow \frac{12!}{2!10!} = \binom{12}{2} = 66$$

3. If 10 people (7 women and 3 men) are to be seated in a circular table, how many possible different arrangements are there if

a. there is not restriction? $(10-1)! = 362,880$

b. the men have to be together? $(8-1)!(3!) = 30,240$

- c. no two men can be next to each other?

$$(7-1)! P(7,3) = 6! \left(\frac{7!}{4!} \right) = 151,200$$


4. Suppose in a lot of 20 missiles, 6 are defective and will not fire. If 5 are chosen at random to be fired, what is the probability that

- a. exactly 2 will not fire? You can leave your answer in combination form.

$$\frac{\binom{6}{2} \binom{14}{3}}{\binom{20}{5}}$$

- b. at most 2 will not fire? You can leave your answer in combination form.

$$\frac{\binom{6}{0} \binom{14}{5} + \binom{6}{1} \binom{14}{4} + \binom{6}{2} \binom{14}{3}}{\binom{20}{5}}$$

- c. at least 1 will not fire? Compute the actual value.

$$1 - \frac{\binom{6}{0} \binom{14}{5}}{\binom{20}{5}} = 1 - 0.1291 = .8709$$