M118
FALL 2000

QUIZ 4

NAME _____

Due: Wednesday, Sept. 20 at the beginning of class.

SET UP FOR ALL 4 PROBLEMS BELOW: A box contains 5 jars of peach preserves, 3 of plum, and 4 of strawberry. Three jars are drawn out at random, one after the other. Express your answers as fractions (one whole number divided by another) in lowest terms.

1) (10 PTS.) What is the probability of drawing out one jar of peach, THEN one jar of strawberry, THEN one jar of plum.

4 PH 3PM 5S

$4 \cdot 3 \cdot 5 = 60$

1 PEACH, 1 PLUM, 1 STRAW

5PH 3PM 4S

$5 \cdot 3 \cdot 4 = 60$

3PH 5PM 4S

$3 \cdot 5 \cdot 4 = 60$

$Pr(1\text{PH, THEN } 1\text{S, THEN } 1\text{PM}) = \frac{3 \cdot 5 \cdot 4}{12 \cdot 11 \cdot 10} = \frac{1}{22}$

ways to choose 3 keeping track of order

Answer: $1/22$

2) (10 PTS.) What is the probability of drawing out one jar of each flavor in any order (i.e. 1 peach, 1 plum, and 1 strawberry in any order)?

one of three jars

$$\frac{\binom{5}{1}\binom{3}{1}\binom{4}{1}}{\binom{12}{3}} = \frac{5 \cdot 3 \cdot 4}{12 \cdot 11 \cdot 10/3!} = \frac{60}{220} = \frac{3}{11}$$

ways to get one of 5 jars

Answer: _____

3) (10 PTS.) What is the probability of drawing out exactly two jars of peach in any order (i.e. 2 peach and 1 strawberry, or 2 peach and 1 plum)?

4PH 3PM 5S

$$\frac{\binom{4}{2}\binom{8}{1}}{\binom{12}{3}} = \frac{6 \cdot 8}{220} = 12/55$$

5PH 3PM 4S

$$\frac{\binom{5}{2}\binom{7}{1}}{\binom{12}{3}} = \frac{10 \cdot 7}{220} = 7/22$$

3PH 5PM 4S

$$\frac{\binom{3}{2}\binom{9}{1}}{\binom{12}{3}} = \frac{3 \cdot 9}{220} = 27/220$$

Answer: _____

SEE OTHER SIDE

4) (5 PTS.) What is the probability that all three of the jars drawn out are peach?

4PH 3PM 5S

$$\frac{\binom{4}{3}}{\binom{12}{3}} = \frac{4}{220} = \frac{1}{55}$$

# of ways to select 3 peach jars from 4

5PH 3PM 4S

$$\frac{\binom{5}{3}}{\binom{12}{3}} = \frac{10}{220} = \frac{1}{22}$$

3PH 5PM 4S

$$\frac{\binom{3}{3}}{\binom{12}{3}} = \frac{1}{220}$$

Answer: _____

5) (10 PTS.) What is the probability that all three of the jars drawn out are the same flavor (i.e. 3 peach, or 3 strawberry, or 3 plum)?

$$\frac{\binom{4}{3} + \binom{5}{3} + \binom{3}{3}}{\binom{12}{3}} = \frac{4+10+1}{220} = \frac{15}{220} = \frac{3}{44}$$

← # ways to get one of each flavor

Answer: _____

6) (10 PTS.) What is the probability that exactly 2 of the jars drawn out are the same flavor (e.g. 2 peach and 1 plum, or 2 strawberry and 1 peach)?

Answer: Pr(2 same flavor) = 1 − Pr(all same flavor or all diffent)

= 1 − Pr(all same) − Pr(all diffent)

= 1 − (answer to 5) − (Answer to 2)

$$= 1 - \frac{3}{44} - \frac{12}{44} = \frac{29}{44}$$

Answer: _____