

Math 1320

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Fall 2018

NAME Answer Key
ID: _____

Exam 3

Thursday, December ^{6th}~~4th~~, 2018

#1	/20
#2	/20
#3	/20
#4	/20
#5	/20
Total	/100

You may use a calculator and the provided formula sheet on this exam. **Wherever necessary, you must show all of your work to receive full credit for a problem.**

- 1) The following table shows the results of a survey of 400 authors by a publishing company.

	New Authors	Established Authors	Total
Successful	40	108	148
Unsuccessful	64	188	252
Total	104	296	400

Compute the relative frequency of the following events. (Round your answer to 2 decimal places.)

- a) An author is unsuccessful and new.

$$\frac{64}{400} = 0.16$$

- b) An author is a successful author.

$$\frac{148}{400} = 0.37$$

- c) An unsuccessful author is established.

$$\frac{188}{252} = .75$$

(.7460317...)

- d) A successful author is new.

$$\frac{40}{148} = .27$$

(.270)

2) Let $A = \{1, 2, 3, 5\}$, $B = \{2, 5, 6, 7\}$, and $C = \{5, 7, 9\}$. Find the following:

$$\begin{array}{l} \text{a) } A \cap (B \cap C) \\ \downarrow \quad \downarrow \\ 1235 \quad 57 \end{array} = \{5\}$$

$$\begin{array}{l} \text{b) } (A \cap B) \cup C \\ \downarrow \quad \downarrow \\ 25 \quad 579 \end{array} = \{2, 5, 7, 9\}$$

$$\begin{array}{l} \text{c) } (A \cup B) \cap C \\ \downarrow \quad \downarrow \\ 123567 \quad 579 \end{array} = \{5, 7\}$$

$$\text{d) Find } n(B \times C) = 4 \times 3 = 12$$

- 3) a) Professor Easy's final examination has 13 true-false questions followed by 2 multiple-choice questions. In each of the multiple-choice questions, you must select the correct answer from a list of six. How many answer sheets are possible?

$$\begin{array}{l} \text{T/F} \\ 2^{13} \times 6^2 = 8192 \times 36 = 294,912 \\ \quad \uparrow \\ \quad \text{followed} \\ \quad \text{by} \end{array}$$

- b) The local diner offers a meal combination consisting of an appetizer, a soup, a main course, and a dessert. There are six appetizers, three soups, four main courses, and six desserts. Your diet restricts you to choosing between a dessert and an appetizer. (You cannot have both.) Given this restriction, how many three-course meals are possible?

$$\begin{array}{l} \text{APP} \qquad \qquad \text{des} \\ 6 \times 3 \times 4 \qquad + \qquad 3 \times 4 \times 6 \end{array}$$

$$72 \quad + \quad 72$$

$$\boxed{144}$$

12

- 4) Suzan has a bag containing 3 red marbles, 4 green marbles, 2 yellow, and 3 white marbles. She picks 6 marbles from the bag at random. Find the probability of the following events, expressing each as a fraction in lowest terms.

$$C(12, 6) = 924 \text{ denom}$$

- a) She has all the green marbles.

$$\begin{array}{l} \text{green} * \text{others} \\ C(4, 4) * C(8, 2) = 1 * 28 = 28 \end{array}$$

$$P(\text{all green}) = \frac{28}{924} = \frac{7}{231} = \frac{1}{33}$$

- b) She has no white marbles.

$$\begin{array}{l} \text{white} * \text{others} \\ C(3, 0) * C(9, 6) = 1 * 84 = 84 \end{array}$$

$$P(\text{no w}) = \frac{84}{924} = \frac{3}{33} = \frac{1}{11}$$

- c) She has three red ones and one of each of the other colors.

$$\begin{array}{l} \text{red} * \text{green} * \text{yellow} * \text{white} \\ C(3, 3) * C(4, 1) * C(2, 1) * C(3, 1) \\ 1 * 4 * 2 * 3 = 24 \end{array}$$

$$P_{\text{prob}} = \frac{24}{924} = \frac{12}{77}$$

- d) She has at least one yellow marble.

$$\begin{array}{l} \text{one Y} * \text{others} + 2 \text{ Y} * \text{others} \\ C(2, 1) * C(10, 5) + C(2, 2) * C(10, 4) \\ 2 * 252 + 1 * 210 \\ 504 + 210 \\ 714 \end{array}$$

$$P_{\text{prob}} = \frac{714}{924} = \frac{17}{22}$$

5) a) Compute the indicated quantity.

$P(A|B) = .3$, $P(B) = .9$. Find $P(A \cap B)$.

$$P(A|B) = .3 = \frac{P(A \cap B)}{.9} = \frac{P(A \cap B)}{P(B)}$$

$$.3(.9) = P(A \cap B)$$

$$.27 = P(A \cap B)$$

b) Compute the indicated quantity.

$P(A) = .2$, $P(B) = .3$. A and B are independent. Find $P(A \cap B)$.

$$P(A \cap B) = P(A) \cdot P(B)$$
$$= .2(.3)$$

$$P(A \cap B) = 0.06$$