Department of Mathematics
University of Notre Dame
Math 10120 – Finite Math.
Spring 2014

Name:_____

Instructor: Galvin/Diaz

Practice Exam 2

March 6, 2014

This exam is in two parts on 11 pages and contains 15 problems worth a total of 100 points. You have 1 hour and 15 minutes to work on it. You **may** use a calculator, but **no** books, notes, or other aid is allowed. Be sure to write your name on this title page and put your initials at the top of every page in case pages become detached.

Record your answers to the multiple choice problems on this page. Place an × through your answer to each problem.

The partial credit problems should be answered on the page where the problem is given. The spaces on the bottom right part of this page are for me to record your grades, **not** for you to write your answers.

May the odds be ever in your favor!

1.	(a)	(b)	(c)	(d)	(e)
2.	(a)	(b)	(c)	(d)	(e)
3.	(a)	(b)	(c)	(d)	(e)
4.	(a)	(b)	(c)	(d)	(e)
5.	(a)	(b)	(c)	(d)	(e)
6.	(a)	(b)	(c)	(d)	(e)
7.	(a)	(b)	(c)	(d)	(e)
8.	(a)	(b)	(c)	(d)	(e)
9.	(a)	(b)	(c)	(d)	(e)
10.	(a)	(b)	(c)	(d)	(e)

MC. _____
11. _____
12. _____
13. _____
14. _____
15. _____

Tot. _____

Multiple Choice

1. (5 pts.) An experiment consists of rolling two dice (say a red one and a green one) and recording the sum of the numbers that appear. Let E be the event that the sum is 6. Find $P(E)$.

(a) 5/36 (b) 6/36 (c) 3/36

(d) 2/36 (e) 4/36

2. (5 pts.) Suppose E and F are two events with $P(E) = 1/4$, $P(F) = 1/2$ and $P((E \cup F)') = 1/3$. Find $P(E \cap F)$.

(a) 1/8 (b) 1/12 (c) 1/4

(d) 1/6 (e) 1/3

3. (5 pts.) Three students are selected at random from a group of 12 boys and 9 girls. What is the probability that 2 of them are boys and the other one is a girl.

(a) $\frac{21}{9261}$ (b) $\frac{1188}{1330}$ (c) $\frac{594}{7980}$

(d) $\frac{1188}{7980}$ (e) $\frac{594}{1330}$

4. (5 pts.) Five cards are randomly drawn from a bridge deck of cards (52 cards, 26 black, 26 red). What is the probability that at least one of them is red?

(a) $\frac{26^5}{52^5}$ (b) $\frac{65780}{2598960}$ (c) $\frac{9328800}{2598960}$ (d) $\frac{2533180}{2598960}$ (e) $\frac{26^5}{2598960}$

5. (5 pts.) An experiment consists of flipping a coin 6 times and observing the sequence of heads and tails that occurs. Let E be the event there are (strictly) more heads than tails. Find $P(E)$.

(a) 18/64 (b) 21/64 (c) 22/64

(d) 44/64 (e) 32/64

6. (5 pts.) Let E and F be two events of an experiment. Which of the following statements is FALSE?

(a) if E and F are independent, then $P(E|F) = P(E)$

(b) if E and F are independent, then $P(E \cap F) = P(E)P(F)$

(c) if E and F are independent, then $P(F|E) = P(F)$

(d) If E and F are mutually exclusive, then $P(E \cup F) = P(E)P(F)$

(e) if E and F are mutually exclusive, then $E \cap F = \emptyset$

7. (5 pts.) On a new game show, The Dice is Trite, Claire is given a 20-sided die (with the sides labelled from 1 to 20, and all sides equally likely to come up). Each time she rolls it, if it is NOT a 17 she is given \$1,000 and told to roll again. When she rolls a 17, she is done. (For example, if a 17 appears on the fifth roll, she gets \$4,000 since she has \$1,000 for each of the first four rolls and nothing for the fifth roll.) What is the probability that she receives **exactly** \$2,000 [a tree diagram would probably help].

(a) $\left(\frac{19}{20}\right)^2 \frac{1}{20}$ (b) $\left(\frac{1}{20}\right)^3$ (c) $\frac{19}{20} \cdot \frac{1}{20}$ (d) $\left(\frac{19}{20}\right)^2$ (e) $\left(\frac{19}{20}\right)^2 + \frac{1}{20}$

8. (5 pts.) Brian rolls a dice 2 times. Find the probability that he first rolls an even number and then a six.

(a) 5/12 (b) 1/2 (c) 1/6

(d) 1/12 (e) 1/2 + 1/6

9. (5 pts.) Three ordinary quarters and a fake quarter with two heads are placed in a hat. One quarter is selected at random and flipped once. What is the probability that it comes up heads?

(a) 1/4 (b) 3/8 (c) 5/8 (d) 3/4 (e) 1/2

10. (5 pts.) At Grinnell College the number of students and of math majors divides as follows:

Class	**No. Students**	**No. Math Majors**
Freshmen	100	50
Sophomores	150	60
Juniors	200	70
Seniors	250	80
	700	260

Let F be the event that a randomly chosen student is a freshman, and M the event that a randomly chosen student is a math major. Find $P(F|M)$.

(a) $\frac{5}{26}$ (b) $\frac{5}{13}$ (c) $\frac{13}{35}$

(d) $\frac{1}{2}$ (e) $\frac{2}{3}$

Partial Credit

You must show **all of your work** on the partial credit problems to receive credit! Make sure that your answer is clearly indicated. You're more likely to get partial credit for a wrong answer if you explain your reasoning.

11. (10 pts.) From a group of 200 students, 50 students are enrolled in Professor Mosby's architecture class, 45 students are enrolled in professor Eriksen's law class and 10 students are enrolled in both classes.
(a) Draw a Venn diagram with the information given above.

(b) A student is selected at random. Let M be the event "is enrolled in Prof. Mosby's class" and E be the event "is enrolled in Prof. Ericksen's class".
Are the events M and E mutually exclusive?

(c) Are the events M and E independent?

12. (10 pts.) A pair of dice, one red and one blue, are rolled.
(a) What is the probability that the sum of the numbers facing up is 9?

(b) What is the probability that both numbers facing up are even.

(c) Given that the number facing up in the red die is odd, what is the probability that the number facing up in the blue die is even.

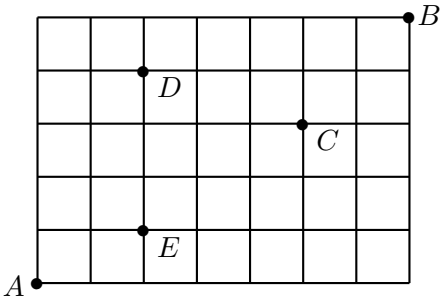
13. (10 pts.) Professor Bunsen always starts his Alchemy 101 lecture course with one of the three great alchemical experiments: turning lead into gold (20% of all times that he teaches the course), brewing the elixir of life (40% of the times) and creating the Philosopher's stone (40% of the time). When he tries to turn lead into gold, the result always ends with a explosion; when he brews the elixir of life, there is a 50% chance of an explosion, and when he creates the Philosopher's stone, 8 times out of 10 there is an explosion.

(a) The next time Professor Bunsen teaches the course, what is the probability of an explosion happening?

(b) What is the probability that either there is an explosion, or the professor attempts to brew the elixir of life?

(c) Dean Crawford wants to see which experiment Professor Bunsen will do this year, but he arrives late. If he see the lecture-hall filled with post-explosion smoke, what (should he conclude) is the probability that he has just missed a demonstration of brewing the elixir of life?

14. (10 pts.) This question involves the usual city grid, with bottom left point A, top right point B, and three middle points C, D, E, with D and E having the same x-coordinate, D having a higher y-coordinate, and C have a greater x-coordinate than both D and E, and a y-coordinate that is in between. The story is that John travels from A to B, using as few blocks as possible, choosing his particular route randomly (all routes equally likely).



(a) What's the probability that along the way he passes C?

(b) At some point he is seen passing E. Now what's the probability that along the way he passes C?

(c) At some point he is seen passing D. Now what's the probability that along the way he passes C?

15. (10 pts.) A child has 6 cards numbered $\{2, 3, 4, 5, 6, 7\}$. The child places three cards in a row to create a 3-digits number.
(a) What is the probability that the number selected is 374?

(b) What is the probability that the number selected is smaller than 500?

(c) What is the probability that the number selected is bigger than 550?

(d) What if the probability that the number selected is between 500 and 550?