

MATH 104 - EXAM II

- Events E and F are independent, $\Pr(E) = \frac{1}{3}$. The conditional probability $\Pr(E|F)$ equals
(a) 0 (b) $\frac{1}{9}$ (c) $\frac{1}{3}$ (d) $\frac{2}{3}$ (e) cannot be determined from the data.
- A box contains 4 white balls and 2 red balls. Three balls are drawn at random from the box without replacement. What is the probability that all balls drawn are of the same color?
(a) .20 (b) .24 (c) .36 (d) .48 (e) .59
- Approximately 40% of Notre Dame undergraduate students are female and 60% are male. What is the probability that two randomly chosen Notre Dame students are of opposite sex?
(a) .20 (b) .24 (c) .36 (d) .48 (e) .59

4. An assembly plant buys a certain part from two suppliers, A and B, in equal quantities. The plant found that 3 in a thousand parts they buy are defective. Supplier A's quality control established that in their shipment only two in a thousand could be defective. What is the conditional probability of a part being defective provided it came from supplier B?
- (a) .001 (b) .002 (c) .003 (d) .004 (e) .005
5. A school requires that all applicants pass an admission test. Those who do not pass the first time are given a second test. 70% of applicants pass the first test. 10% of applicants taking the second test pass it. What is the probability that a random applicant is admitted?
- (a) .65 (b) .73 (c) .75 (d) .80 (e) .97
6. Two dice are thrown and the numbers on top are observed. What is the conditional probability that both numbers are even provided their sum equals 6?
- (a) $\frac{1}{6}$ (b) $\frac{1}{3}$ (c) $\frac{2}{5}$ (d) $\frac{1}{2}$ (e) $\frac{2}{3}$

7. There are 3 boxes labelled A, B and C. Box A contains 3 white balls and 7 red balls, box B contains 6 white balls and 4 red balls, box C contains 9 white balls and 1 red ball. A box was chosen at random and a ball was extracted from it also at random. The ball was white. What is the probability that it comes from box A?
- (a) 0 (b) $\frac{1}{6}$ (c) $\frac{1}{3}$ (d) $\frac{1}{2}$ (e) $\frac{2}{3}$

8. Which column of the following table represents the probability distribution for the number of heads in 4 tosses of a coin?

No of heads	Probabilities				
	a	b	c	d	e
0	0	$\frac{1}{5}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$
1	$\frac{1}{4}$	$\frac{1}{5}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{16}$
2	$\frac{1}{4}$	$\frac{1}{5}$	$\frac{3}{8}$	$\frac{3}{4}$	$\frac{1}{4}$
3	$\frac{1}{4}$	$\frac{1}{5}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{4}$
4	$\frac{1}{4}$	$\frac{1}{5}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{3}{8}$

9. The following table represents the relative frequencies for an experiment with possible outcomes 1, 2, 3, 4, 5

Outcome	1	2	3	4	5
Relative frequency	.1	.3	.3	.1	.2

- The mean equals (a.) 1.0 (b) 2.0 (c) 2.5 (d) 3.0
 (e) 3.5

10. A player throws a red and a green die. He wins \$7 if both numbers are equal. He loses \$1 if the number on the green die is larger than the number on the red die and loses \$3 if the number on the red die is larger than the number on the green die. What are the expected winnings of the player?

(a) -\$1.00
\$3.00

(b) -\$0.50

(c) 0

(d) \$1.50

(e)

11. An observer recorded the following sequence of measurements
2.0, 2.3, 2.3, 1.9, 2.0 What is the mean of the sample?

(a.) 2.0
(e) 10.5

(b) 2.1

(c) 2.3

(d) 2.15

12. A die is rolled 125 times and the number of 4's is recorded. Find the standard deviation.

(a) $\frac{1}{6}$

(b) $\frac{5}{6}$

(c) $\frac{25}{36}$

(d)

$\frac{1}{2}$

(e) $\frac{25}{6}$

13. The probability distribution of a random variable X is as follows:

$X = k$	$\Pr(X = k)$
10	0.3
20	0.4
30	0.3

What is the variance of X?

- (a) 460 (b) 20 (c) 60 (d) 6 (e) 0

14. A fraternity has 20% of its members on the Dean's list. If ten members are chosen at random, what is the probability that at most two of them will be on the Dean's list?

- (a) $(0.8)^{10} + 10(0.2)(0.8)^9 + \binom{10}{2}(0.2)^2(0.8)^8$
- (b) $(0.8)^{10} + (0.2)(0.8)^9 + (0.2)^2(0.8)^8$
- (c) $(0.2)^{10} + 10(0.2)^9(0.8) + \binom{10}{2}(0.2)^8(0.8)^2$
- (d) $(0.2)^{10} + (0.2)^9(0.8) + (0.2)^8(0.8)^2$
- (e) $(0.2)^2(0.8)^8$

15. Each time a basketball player attempts a free throw, she has an 80% chance of making it. Let X be the number of free throws she makes in 100 attempts. Find the standard deviation of X.

- (a) 16 (b) 0.16 (c) 80 (d) 20 (e) 4

16. A six-sided die is rolled and if a five or six comes up you win a prize. What is the probability of winning a prize exactly seven times in ten attempts?

(a) $\binom{10}{7} \left(\frac{2}{3}\right)^7 \left(\frac{1}{3}\right)^3$
 $\left(\frac{2}{3}\right)^3$

(b) $\binom{10}{7} \left(\frac{1}{3}\right)^7 \left(\frac{2}{3}\right)^3$

(c) $\left(\frac{1}{3}\right)^7$

(d) $\left(\frac{1}{3}\right)^3 \left(\frac{2}{3}\right)^7$

(e) $\left(\frac{1}{3}\right)^7$

17. Let Z be a random variable with a standard normal distribution. What is $\Pr(-1 < Z < 1.5)$?

(a) 0.6247

(b) 0.7683

(c) 0.7745

(d) 0.7621

(e)

0.7925

18. The manufacturer of the light bulb, Sunshine, has found that the life of the bulb is normally distributed with mean $\mu = 1000$ hours and standard deviation $\sigma = 50$ hours. The company decides to give a money back guarantee if a light bulb fails before 950 hours. A bulb is selected at random. What is the probability that the company will have to refund its price?

(a) 0.0228

(b) 0.1

(c) 0.9772

(d) 0.1587

(e) 0.0002

19. A random variable X has a normal distribution with mean $\mu = 20$.
If $\Pr(X \geq 30) = 0.0668$, find σ , the standard deviation of X .

- (a) 10 (b) $\frac{20}{3}$ (c) $\frac{25}{4}$ (d) $\frac{17}{3}$
(e) 1

20. One-third of the people in a town oppose an upcoming bond issue. Eighteen people are selected at random. Use the normal approximation to the binomial to estimate the probability that exactly five of them oppose the bond issue.

- (a) 0.1747 (b) 0.1915 (c) 0.1498 (d) 0.3413 (e)
0.3085