College Prep Stats
Review for Test Chapter 5

Part I: Determine whether the following is a probability distribution. Answer Y for "Yes", N for "No". Use the following A) ~ D) for your reason(s). <u>The reason(s) could be used more than once and each question could have more than one reason.</u>

A) The probabilities add up equal to 1 or close enough to 1.
B) The probabilities add to less than one or greater than one or not close enough to one.
C) Each individual probability is not a number between 0 and 1 inclusive.
D) There is not enough information to determine whether it is a probability distribution.

1.)

x	P(x)
1	0.200
2	0.037
3	0.184
4	0.446
5	0.133

1. _____Yes_____

Reason: _____(A)_____

2.)

x	P(x)
1	0.204
2	0.301
3	0.507
4	-0.033
5	0.021

2. _____No_____

Reason: _____(C)_____

3.)

x	P(x)
1	0.290
2	0.218
3	0.047
4	0.033
5	0.416

3. _____ No _____

Reason: _____(B)_____

Part II: <u>Determine</u> whether the given problem fits the requirements of a Binomial probability distribution (B), a Poisson probability distribution (P), or neither (N).

4.) Rolling a single die 57 times and keeping track of the numbers that are rolled. **4.** _____N_____
There are total of 6 outcomes not 2. No interval.

5.) Rolling a single die 47 times and keeping track of the "fives" rolled. **5.** _____B_____
There are 1) fix number of trials, 2) indep. 3) 2 outcomes not 6, 4) prob. keeps the same. No interval.

6.) The average number of cars sold by the Westphil car dealer is 3 cars per day. What is the probability that exactly 4 cars will be sold tomorrow? **6.** _____P_____
1) Random, 2) Indep., 3) Have interval. 4) Uniformly distributed

Part III: Determine whether the events are discrete (D) or continuous (C).
7.) The temperature of a randomly selected day. **7.** _____C_____
Can increase or decrease as smaller as you want.

8.) The number of softball bats Mr. Smith owns.
Only can be integer.

8. _____D_____

9.) The cost of a randomly selected cell phone.
Only can be integer cents, can not be 0.0278 cents.

9. _____D_____

Part IV: Short Answer. <u>This includes probability statements and calculator commands.</u>

10.) You pay $15 to enter a raffle in which you have a 0.03 chance of winning $2,000. If you play this game once every day, find the expected value and the probability of winning exactly once in 365 days.

10. E=____45_____

$P(1)$ =__0.00016762__

-15	0.97
1985	0.03

E(X) = -15 * 0.97 + 1985 * 0.03 = 45
n = 365, p = 0.03, x = 1
P(1) = binompdf(365, 0.03, 1) = 0.00016762 = 1.6762E-4

11.) Focus groups of 13 people are randomly selected to discuss products of the Yummy Company. It is determined that the mean number (per group) who recognize the Yummy brand name is 8.4, and the standard deviation is 0.97. Would it be unusual to randomly selected 13 people and find that fewer than 5 recognize the Yummy brand name?

11.Low___6.46_____

Upper____10.34_____

Usual____**Unusual**_√_

$\mu - 2\sigma = 8.4 - 2(0.97) = 6.46$
$\mu + 2\sigma = 8.4 + 2(0.97) = 10.34$

5 < 6.46, unusual low

12.) The number of golf balls ordered by customers of a pro shop has the following distribution. Find the mean and standard deviation for this distribution.

12. μ =___1.8554_____

σ = _____0.9082_____

x	P(x)
0	0.0296
1	0.3456
2	0.4254
3	0.1386
4	0.0608

$\sum P(x) = 1$, it is a probability distribution.
$\mu = \sum x \bullet P(x) = sum(L1 * L2) = 1.8554 \rightarrow A$
$\sigma^2 = \sum x^2 \bullet P(x) - \mu^2 = sum(L1^2 * L2) - A^2 = 0.82489$
$\sigma = \sqrt{0.82489} = 0.9082$

13.) The probability that a box of 4 desk phone will contain 0, 1, 2, 3, 4 defective ones are 0.5896, 0.2665, 0.0964, 0.0388, and 0.0087, respectively. Find the μ and σ of this distribution.

13. μ =_____0.6105_____

σ = _____0.8762_____

x	P(x)
0	0.5896
1	0.2665
2	0.0964
3	0.0388
4	0.0087

$\sum P(x) = 1$, it is a probability distribution.
$\mu = \sum x \bullet P(x) = sum(L1 * L2) = 0.6105 \rightarrow A$
$\sigma^2 = \sum x^2 \bullet P(x) - \mu^2 = sum(L1^2 * L2) - A^2 = 0.76779$
$\sigma = \sqrt{0.76779} = 0.8762$

14.) In a game, you pay $6 to play and win $110. If you have a 1/25 probability of winning and a 24/25 probability of losing, what is the expected value of your profit?

14. _____– 1.6_____

-6	24/25
104	1/25

E(X) = –6 * 24/25 + 104 * 1/25 = – 1.6

15.) Suppose that 12% of people are left handed. If 20 people are selected at random, what is the probability that exactly 2 of them are left handed?

15. _____0.2740_____

n = 20, p = 0.12, x = 2

P(2) = binompdf(20, 0.12, 2) = 0.2740

16.) What is the probability of having at least three baby boys in 6 total births? Assume that male and female births are equally likely and that the births are independent events.

16. _____0.6563_____

n = 6, p = 0.5, $x \geq 3$, at least 3 $\Rightarrow$ 3, 4, 5, etc. not include 0 so we use the complement event "at most 2" $\Rightarrow$ $x \leq 2$, $\Rightarrow$ use "1 – binomcdf" and complement event

$P(x \geq 3) = 1 - P(x \leq 2) = 1 - \text{binomcdf}(6, 0.5, 2) = 0.6563$

17.) According to a college survey, 27% of all students work full time. Find the average and standard deviation for the number of students who work full time in a sample size of 25 students.

17. μ =_____6.75_____

σ =_____2.2198_____

n = 25, p = 0.27,

$$\mu = np = 25 * 0.27 = 6.75$$

$$\sigma = \sqrt{npq} = \sqrt{25 * 0.27 * 0.73} = 2.2198$$

Part V: Multiple Choice

18.) Does the given procedure result in a binomial distribution? Rolling a single die 57 times, keeping track of the numbers that are rolled.

18. _____A_____

a) Not binomial: there are more than two outcomes for each trial.
b) Not binomial: the trials are not independent.
c) Not binomial: there are too many trials.
d) Procedure results in a binomial distribution.

19.) Find the minimum usual value and the maximum usual value when n = 1056 and p = 0.80

19. _____C_____

$$\mu = np = 1056 * 0.80 = 844.80$$

$$\sigma = \sqrt{npq} = \sqrt{1056 * 0.80 * 0.20} = 12.9985$$

$$\mu - 2\sigma = 844.80 - 2(12.9985) = 818.8031$$

$$\mu + 2\sigma = 844.80 + 2(12.9985) = 870.7969$$

a) Minimum: 826.42; maximum: 863.18
b) Minimum: 831.8; maximum: 857.8
c) Minimum: 818.8; maximum: 870.8
d) Minimum: 870.8; maximum: 818.8

20.) Sampling without replacement involves dependent events, so this would not be considered a binomial experiment. Explain the circumstances under which sampling without replacement could be considered independent and, thus, binomial.

20. _____B_____

a) $n > 0.05N$ b) $n \leq 0.05N$ c) $n \geq 0.05N$ d) $n = 0.05N$

21.) Does the given procedure result in a binomial distribution? Rolling a single die 47 times, keeping track of the "fives" rolled.

21. _____D_____

a) Not binomial: the trials are not independent.
b) Not binomial: there are too many trials.
c) Not binomial: there are more than two outcomes for each trial.
d) Procedure results in a binomial distribution.