

Week in Review #8

1. Let X be the amount paid out on a claim then the probability distribution is

X	500	100	0
prob	.1	.4	.5

$$E(x) = 500 * .1 + 100 * .4 + 0 * .5 = 90$$

2. Let X be the net winnings and let A be the cost of the game.

X	12-A	5-A	2-A	0	-A
prob.	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{2}{8}$	$\frac{1}{8}$	$\frac{3}{8}$

Want $E(X) = 0$. Solve this equation for A.

Answer: $A = \$3$

3. Type the values of X into L_1 , the frequency(cars) into L_2 , and then compute

1-Var Stats L_1, L_2

- (a) mean = 3.3140
- (b) median = 3
- (c) mode = 3
- (d) $E(x) = 3.3140$

This is a sample. If your instructor did not talk about data being a sample then use the population results.

- (e) sample variance = 3.3698
population variance = 3.3661
- (f) sample st. dev. = 1.8357
population st. dev. = 1.8347

4. Type the values of X into L_1 , the frequency(students) into L_2 , and then compute

1-Var Stats L_1, L_2

- (a) mean = 2.995
- (b) median = 3
- (c) mode = 2 and 3
- (d) $E(x) = 2.995$

This data is a population since the entire class is surveyed

- (e) population variance = 3.4251
- (f) population st. dev. = 1.8507

5. Compute the expected number of houses sold with each company, $E(A) = 18.56$ $E(B) = 11.57$, and then multiply by the average price of each house and by 0.03 to get the expected commission.

Company A: $18.56 * 98000 * 0.03 = 54566.40$

Company B: $11.57 * 150000 * 0.03 = 52065$

Answer: company A since its expected commission is larger than company B.

6. $\frac{P(E)}{P(E^c)} = \frac{1-.8}{.8} = \frac{.2}{.8} = \frac{1}{4}$.

Answer: 1 to 4.

7. The odds against event A are 23 to 2 can be restated as the odds in favor of A are 2 to 23. These odds say that for every 2 times A occur there will be 23 times that it does not occur. Hence $P(A) = \frac{2}{2+23} = \frac{2}{25}$

8. a Chebychev's problem.

first find the value of k.

$$\mu + k\sigma = 24 + k * 3 = 28 \text{ or } k = \frac{4}{3}$$

The prob. that the hair dryers will last between 20 and 28 months is $\geq 1 - \frac{1}{(\frac{4}{3})^2} = \frac{7}{16}$

9. a Chebychev's problem.

first find the value of k.

$$\mu + k\sigma = 36 + k * 4 = 30 \text{ or } k = 1.5$$

The prob. that the product will last between 30 months and 42 months is $\geq 1 - \frac{1}{1.5^2} = 0.5555555555 = \frac{5}{9}$

The number of items will be at least $9000 * \frac{5}{9}$ or at least 5000 items

10. (a) This part is not a binomial problem since which trials are success and which are failures are specified. Use a tree to get this answer.

$$\frac{2}{5} \frac{2}{5} \frac{2}{5} \frac{3}{5} \frac{3}{5} = \left(\frac{2}{5}\right)^3 * \left(\frac{3}{5}\right)^2$$

(b) $n=5, p=\frac{2}{5}, r=4$
 $\text{binompdf}(5,0.4,4) = 0.0768$

(c) $n=5, p=\frac{2}{5}, r=2, 3, 4$
 $\text{binompdf}(5,0.4,2) + \text{binompdf}(5,0.4,3) + \text{binompdf}(5,0.4,4)$
or $\text{binomcdf}(5,0.4,4) - \text{binomcdf}(5,0.4,1)$

Answer: 0.6528

11. note: p = probability of success. convert the number of failures to the number of success. one failure means 4 success; 2 failures means 3 success;

$$n=5, p=\frac{3}{7}, r=0, 1, 2, 3, 4$$

$$\text{binomcdf}(5, \frac{3}{7}, 4)$$

Answer: 0.9855

12. (a) $n=25, p=\frac{1}{6}, r=0, 1, 2, 3, 4$

$$\text{binomcdf}(25, \frac{1}{6}, 4)$$

Answer: 0.5937

- (b) $n=25, p=\frac{2}{6}, r=7, 8, 9, \dots, 25$

$$\text{binomcdf}(25, \frac{2}{6}, 25) - \text{binomcdf}(25, \frac{2}{6}, 6)$$

Answer: 0.7785

- (c) For a binomial the expected value has a shortcut: $E(X) = np$

$$\text{Answer: } 25 * \frac{2}{6} = 8.33333$$

- (d) For a binomial the standard deviation has a shortcut: $\mu = \sqrt{npq}$

$$\text{Answer: } \sqrt{25 * \frac{2}{6} * \frac{4}{6}} = 2.357022$$

- (e) Since the first three rolls are multiples of three, this means the number of trials is actually 22 and we need at least 4 of the remaining 22 rolls to be a multiple of three.

$$n=22, p=\frac{2}{6}, r=4, 5, 6, \dots, 22$$

$$1 - \text{binomcdf}(22, \frac{2}{6}, 3)$$

Answer: 0.9649

13. (a) $n=80, p=0.15, r=5$

$$\text{binompdf}(80, 0.15, 5)$$

Answer: 0.0092856

- (b) $n=80, p=0.15, r=0, 1, 2, \dots, 15$

$$\text{binomcdf}(80, 0.15, 15)$$

Answer: 0.862466

- (c) break into two parts.

$$n=80, p=0.15, r=5, 6, 7, 8, 9, 10$$

$$\text{binomcdf}(80, 0.15, 10) - \text{binomcdf}(80, 0.15, 4)$$

first part: 0.32522

$$n=80, p=0.15, r=20, 21, 22, \dots, 30$$

$$\text{binomcdf}(80, 0.15, 30)$$

$$\text{binomcdf}(80, 0.15, 19)$$

second part: 0.01315

$$\text{Final Answer: } 0.32522 + 0.01315 = 0.33837$$

- (d) $E(X) = 80 * 0.15 = 12$

- (e) $n=70$ (since we know the results of the first 10 people)

$$p=0.015$$

since 5 people of the first 10 had a reaction, we only need 12 more people to get a total of 17.

$$r=12$$

$$\text{binomcdf}(70, 0.15, 12)$$

Answer: 0.1112