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 $\mathbf{L_1}$,$\mathbf{L_2}$**

(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 $\mathbf{L_1}$,$\mathbf{L_2}$**

(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, $E(A) = 18.56 \quad E(B) = 11.57$, 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.

$\mu + k\sigma = 24 + k * 3 = 28$ 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.
$\mu + k\sigma = 36 + k * 4 = 42$ 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
binompdf(5,0.4,4) = 0.0768

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

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

    Answer: 0.9855

12. (a) n=25, p= $\frac{1}{6}$, r=0,1, 2, 3,4
    binomcdf(25,$\frac{1}{6}$,4)
    Answer: 0.5937

    (b) n=25, p= $\frac{2}{6}$, r=7, 8, 9,...,25
    binomcdf(25,$\frac{2}{6}$,25) - binomcdf(25,$\frac{2}{6}$,6)
    Answer: 0.7785

    (c) For a binomial the expected value has a shortcut: $E(X) = np$
    Answer: $25 * \frac{2}{6} = 8.33333$

    (d) For a binomial the standard deviation has a shortcut: $\mu = \sqrt{npq}$
    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,...,22
    1 - binomcdf(22,$\frac{2}{6}$,3)
    Answer: 0.9649

13. (a) n=80, p= 0.15, r=5
    binompdf(80,0.15,5)
    Answer: 0.0092856

    (b) n=80, p= 0.15, r=0, 1, 2, ..., 15
    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
    binomcdf(80,0.15,10) - binomcdf(80,0.15,4)
    first part: 0.32522
    n=80, p= 0.15, r=20, 21, 22, ... 30
    binomcdf(80,0.15,30) - binomcdf(80,0.15,19)
    second part: 0.01315
    Final Answer: 0.32522+0.01315 = 0.33837

    (d) E(X) = 80*.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
    binompdf(70,0.15,12)
    Answer: 0.1112