SEATTLE PACIFIC UNIVERSITY
School of Business, Government, and Economics
BUS 2700 Statistics for Business and Economics
Practice Assignment 1

1. If a password consists of upper case letters, lower case letters, and numerical digits (so there are 62 possible characters to choose from), how many possible passwords are there if the number of characters in the password is:
   (a) 4
   (b) 8
   (c) 12
   (d) 20

2. What is $Pr(AorB)$ for each of these situations:
   (a) $Pr(A) = 0.200$; $Pr(B) = 0.100$; $Pr(A \; and \; B) = 0.040$
   (b) $Pr(A) = 0.420$; $Pr(B) = 0.560$; $Pr(A \; and \; B) = 0.380$
   (c) $Pr(A) = 0.500$; $Pr(B) = 0.700$; $Pr(A \; and \; B) = 0.200$
   (d) $Pr(A) = 0.500$; $Pr(B) = 0.700$; $Pr(A \; and \; B) = 0.900$
   (e) $Pr(A) = 0.164$; $Pr(B) = 0.318$; $Pr(A \; and \; B) = 0.085$
   (f) $Pr(A) = 0.320$; $Pr(B) = 0.440$; $Pr(A \; and \; B) = 0.000$
   (g) $Pr(A) = 0.320$; $Pr(B) = 0.440$; A and B are independent events
   (h) $Pr(A) = 0.500$; $Pr(B) = 0.500$; A and B are independent events
   (i) $Pr(A) = 0.070$; $Pr(B) = 0.030$; A and B are independent events
   (j) $Pr(A) = 0.001$; $Pr(B) = 0.001$; A and B are independent events

3. If M people in a population of N people agree with Proposition X, and you select a random sample of size n from this population, what is the probability that k people in the sample will agree with Proposition X, for each of these values:

	N	M	n	k
(a)	10	6	5	0
(b)	10	6	5	1
(c)	10	6	5	2
(d)	10	6	5	3
(e)	10	6	5	4
(f)	10	6	5	5
(g)	12	8	4	0
(h)	12	8	4	1
(i)	12	8	4	2
(j)	12	8	4	3
(k)	12	8	4	4

4. You've estimated that the probability that a new product will be a success is $p = 0.5800$. If you've launched 5 new products, what is the probability they all be failures? What is the probability the number of successess will be 1? or 2? or 3? or 4? What is the probability they will all be sucessess? What is the expected value and the variance for the number of successsses?

5. The following lists show daily sales figures for each day of the week for five different weeks. Calculate the average, median, and standard deviation for the sales figures for each week.

$$week1 : 9, 7, 7, 8, 12$$

$$week2 : 10, 2, 12, 6, 15$$

$$week3 : 7, 7, 7, 7, 9$$

$$week4 : 0, 18, 3, 20, 24$$

$$week5 : 4, 5, 4, 200, 8$$

6. Use Excel to create a table for the probabilities for $X = k$, where X has a hypergeometric distribution with population size $N = 425$, sample size $n = 32$, and the number of successes in the population equal to $M = 262$. Create the table for values of k from 0 to 32, showing both the probability of the specific values and the cumulative probabilities. Display 5 decimal places for each result. Include this spreadsheet in your Excel portfolio.

7. Use Excel to create a table for the probabilities for $X = k$, where X has a binomial distribution with the number of trials $n = 240$ and the probability of success equal p= 0.0200. Create the table for values of k from 0 to 16, showing both the probability of the specific values and the cumulative probabilities. Display 5 decimal places for each result. Include this spreadsheet in your Excel portfolio.

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Practice Assignment 1 Answers

1. (a) $62^4 = 1.4776 \times 10^7$

   (b) $62^8 = 2.1834 \times 10^{14}$

   (c) $62^{12} = 3.2263 \times 10^{21}$

   (d) $62^{20} = 7.0442 \times 10^{35}$

2. (a) $0.200 + 0.100 - 0.0400 = 0.2600$

   (b) $0.420 + 0.560 - 0.3800 = 0.6000$

   (c) $0.500 + 0.700 - 0.2000 = 1$

   (d) can't happen [Pr(A and B) can't be greater than Pr(A)]

   (e) $0.164 + 0.318 - 0.0850 = 0.3970$

   (f) $0.320 + 0.440 - 0 = 0.7600$

   (g) $0.3200 + 0.4400 - 0.1408 = 0.6192$

   (h) $0.5000 + 0.5000 - 0.2500 = 0.7500$

   (i) $0.0700 + 0.0300 - 0.0021 = 0.0979$

   (j) $0.00100000 + 0.00100000 - 0.00000100 = 0.00199900$

3. (a) There is zero probability of getting 0 people who agree and 5 people who disagree in the sample, since there are only 4 people that disagree in the population.

   (b)

$$\frac{\binom{6}{1} \times \binom{10-6}{5-1}}{\binom{10}{5}} = \frac{\binom{6}{1} \times \binom{4}{4}}{\binom{10}{5}} = \frac{6 \times 1}{252} = 0.0238$$

   (c)

$$\frac{\binom{6}{2} \times \binom{10-6}{5-2}}{\binom{10}{5}} = \frac{\binom{6}{2} \times \binom{4}{3}}{\binom{10}{5}} = \frac{15 \times 4}{252} = 0.2381$$

(d)

$$\frac{\binom{6}{3} \times \binom{10-6}{5-3}}{\binom{10}{5}} = \frac{\binom{6}{3} \times \binom{4}{2}}{\binom{10}{5}} = \frac{20 \times 6}{252} = 0.4762$$

(e)

$$\frac{\binom{6}{4} \times \binom{10-6}{5-4}}{\binom{10}{5}} = \frac{\binom{6}{4} \times \binom{4}{1}}{\binom{10}{5}} = \frac{15 \times 4}{252} = 0.2381$$

(f)

$$\frac{\binom{6}{5} \times \binom{10-6}{5-5}}{\binom{10}{5}} = \frac{\binom{6}{5} \times \binom{4}{0}}{\binom{10}{5}} = \frac{6 \times 1}{252} = 0.0238$$

(g)

$$\frac{\binom{8}{0} \times \binom{12-8}{4-0}}{\binom{12}{4}} = \frac{\binom{8}{0} \times \binom{4}{4}}{\binom{12}{4}} = \frac{1 \times 1}{495} = 0.0020$$

(h)

$$\frac{\binom{8}{1} \times \binom{12-8}{4-1}}{\binom{12}{4}} = \frac{\binom{8}{1} \times \binom{4}{3}}{\binom{12}{4}} = \frac{8 \times 4}{495} = 0.0646$$

(i)

$$\frac{\binom{8}{2} \times \binom{12-8}{4-2}}{\binom{12}{4}} = \frac{\binom{8}{2} \times \binom{4}{2}}{\binom{12}{4}} = \frac{28 \times 6}{495} = 0.3394$$

(j)

$$\frac{\left(\begin{array}{c}8\\3\end{array}\right)\times\left(\begin{array}{c}12-8\\4-3\end{array}\right)}{\left(\begin{array}{c}12\\4\end{array}\right)}=\frac{\left(\begin{array}{c}8\\3\end{array}\right)\times\left(\begin{array}{c}4\\1\end{array}\right)}{\left(\begin{array}{c}12\\4\end{array}\right)}=\frac{56\times 4}{495}=0.4525$$

(k)

$$\frac{\left(\begin{array}{c}8\\4\end{array}\right)\times\left(\begin{array}{c}12-8\\4-4\end{array}\right)}{\left(\begin{array}{c}12\\4\end{array}\right)}=\frac{\left(\begin{array}{c}8\\4\end{array}\right)\times\left(\begin{array}{c}4\\0\end{array}\right)}{\left(\begin{array}{c}12\\4\end{array}\right)}=\frac{70\times 1}{495}=0.1414$$

4. Let X equal the number of successes, which will have a binomial distribution with $n = 5$ and $p = 0.58$.

$$Pr(X=0)=\left(\begin{array}{c}5\\0\end{array}\right)0.58^0 0.42^5 = 1\times 1.00000000\times 0.01306912 = 0.0131$$

$$Pr(X=1)=\left(\begin{array}{c}5\\1\end{array}\right)0.58^1 0.42^4 = 5\times 0.58000000\times 0.03111696 = 0.0902$$

$$Pr(X=2)=\left(\begin{array}{c}5\\2\end{array}\right)0.58^2 0.42^3 = 10\times 0.33640000\times 0.07408800 = 0.2492$$

$$Pr(X=3)=\left(\begin{array}{c}5\\3\end{array}\right)0.58^3 0.42^2 = 10\times 0.19511200\times 0.17640000 = 0.3442$$

$$Pr(X=4)=\left(\begin{array}{c}5\\4\end{array}\right)0.58^4 0.42^1 = 5\times 0.11316496\times 0.42000000 = 0.2376$$

$$Pr(X=5)=\left(\begin{array}{c}5\\5\end{array}\right)0.58^5 0.42^0 = 1\times 0.06563568\times 1.00000000 = 0.0656$$

The expected value $E(X)$ is $5 \times 0.5800 = 2.9000$ and the variance is $Var(X) = 5 \times 0.5800 \times (1 - 0.5800) = 1.2180$.

5.

$$week1: \quad \overline{x1} = \frac{9+7+7+8+12}{5} = \frac{43.000}{5} = 8.600$$

$$\sigma_{x1} = \sqrt{77.400 - 8.600^2} = 1.855 \qquad \text{median} = 8$$

$$week2: \quad \overline{x2} = \frac{10+2+12+6+15}{5} = \frac{45.000}{5} = 9.000$$

$$\sigma_{x2} = \sqrt{101.800 - 9.000^2} = 4.561 \qquad \text{median} = 10$$

$$week3: \quad \overline{x3} = \frac{7+7+7+7+9}{5} = \frac{37.000}{5} = 7.400$$

$$\sigma_{x3} = \sqrt{55.400 - 7.400^2} = 0.800 \qquad \text{median} = 7$$

$$week4: \quad \overline{x4} = \frac{0+18+3+20+24}{5} = \frac{65.000}{5} = 13.000$$

$$\sigma_{x4} = \sqrt{261.800 - 13.000^2} = 9.633 \qquad \text{median} = 18$$

$$week5: \quad \overline{x5} = \frac{4+5+4+200+8}{5} = \frac{221.000}{5} = 44.200$$

$$\sigma_{x5} = \sqrt{8,024.200 - 44.200^2} = 77.914 \qquad \text{median} = 5$$

6.

k	$\Pr(X = k)$	Cumulative
0	$6.101399679 \times 10^{-15}$	$6.101399679 \times 10^{-15}$
1	$3.875313251 \times 10^{-13}$	$3.936327248 \times 10^{-13}$
2	$1.178765395 \times 10^{-11}$	$1.218128668 \times 10^{-11}$
3	$2.287156737 \times 10^{-10}$	$2.408969604 \times 10^{-10}$
4	$3.181265602 \times 10^{-9}$	$3.422162562 \times 10^{-9}$
5	0.000000034	0.000000037
6	0.000000285	0.000000323
7	0.000001966	0.000002288
8	0.000011270	0.000013558
9	0.000054523	0.000068081
10	0.000225014	0.000293095
11	0.000798640	0.001091735
12	0.002453166	0.003544901
13	0.006552260	0.010097162
14	0.015270317	0.025367479
15	0.031126346	0.056493825
16	0.055569526	0.112063351
17	0.086932295	0.198995646
18	0.119118637	0.318114284
19	0.142775181	0.460889465
20	0.149346621	0.610236086
21	0.135871738	0.746107824
22	0.107010094	0.853117918
23	0.072508251	0.925626170
24	0.041926142	0.967552312
25	0.020468558	0.988020869
26	0.008318799	0.996339668
27	0.002761233	0.999100901
28	0.000728762	0.999829663
29	0.000147009	0.999976672
30	0.000021275	0.999997947
31	0.000001966	0.999999913
32	0.000000087	1.000000000

7.

k	$Pr(X = k)$	Cumulative
0	0.00784	0.00784
1	0.03839	0.04623
2	0.09364	0.13987
3	0.15160	0.29147
4	0.18331	0.47479
5	0.17658	0.65137
6	0.14114	0.79251
7	0.09629	0.88880
8	0.05723	0.94604
9	0.03011	0.97615
10	0.01419	0.99034
11	0.00606	0.99640
12	0.00236	0.99876
13	0.00084	0.99960
14	0.00028	0.99988
15	0.00009	0.99997
16	0.00002	0.99999