MATHEMATICS 360-255-LW
Quantitative Methods II
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Fall 2009

Probabilities with Excel

Open Excel and in cell A1 write in Bold 16 "Business Statistics". In cell A2 write "Probabilities with Excel", in cell A3 write "By: *your name*" and in cell A4 write the date, all in the default font. Label Sheet 1 "Permutations and Combinations". Save your work under "Probabilities with Excel". Don't forget to periodically save your work!

Permutations and Combinations

Write, in cell A6, "Permutations and Combinations" in bold. In cell A7 write "Permutation of 3 in 5" and in cell A8 "Combination of 3 in 5". Adjust the column width accordingly (using ✥ when you place your mouse between columns A and B).
In cells B7 and B8, find the number of permutations and combinations of 5 object taken 3 at a time by clicking the f_x button and going in ALL, choosing the functions PERMUT(n,r) and COMBIN(n,r), depending on which of the two you need.

	A	B	C
1	**Quantitative Methods II**		
2	Probabilities with Excel		
3	By Martin Huard		
4	September 15, 2008		
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7	**Permutations and Combinations**		
8	Permuation of 3 in 5	60	
9	Combination of 3 in 5	10	

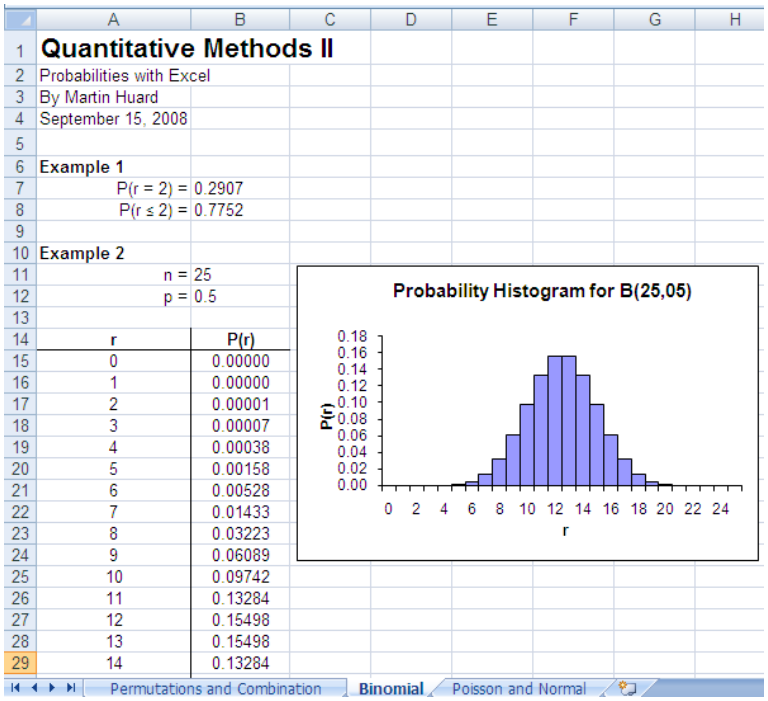
Binomial Probability distribution

Click on Sheet 2, label it "Binomial" and make a heading similar to the one on the previous sheet. To calculate binomial probabilities with *n* trials and probability of success *p* we use the command BINOMDIST(r,n,p, cumulative) where cumulative is either TRUE or FALSE. The difference between the two is: FALSE gives $P\ r = r_o$ where as TRUE gives $P\ r \le r_o$.

Example 1
Suppose a die is rolled 10 times and the number of '6' are counted.
Write "Example 1" in cell A6 and in cell A7 write "P(r = 2)". Calculate the probability of having exactly two '6' in cell B7 using the BINOMDIST function. Note that in this case, CUMULATIVE is FALSE.
In cell A8 write "P(r ≤ 2)". Calculate the probability of having at most two '6' in cell B8 using the BINOMDIST function. Note that in this case, CUMULATIVE is TRUE.

Example 2
Suppose that a coin is tossed 25 times and the number of heads is counted.
Write "Example 2" in cell A9, "n = " in cell A10 and "p = " in cell A11. In cell B10 write the value for *n*, which in this case is 25, and the value for *p* in cell B11, which in this case is 0.5.Let us now generate the probability distribution. Write "r" in cell A13 and "P(r)" in cell B13. In cells A14:A39, write the numbers from 0 to 25 (use your mouse to generate the list!). In cell B14, find the binomial probability, making references to cells, so that the rest of the probabilities are found by copying. Lastly, let us draw a histogram. Blacken the values in the $p\ x$ column, the cells B14:B39. Go to INSERT and choose a COLUMN graph (the 2-D one). To have the

values of *x* start at zero, click on SELECT DATA and on EDIT in the HORIZONTAL (CATEGORY) AXIS LABELS. Blacken the list of trees, that is, the cells A14:A39. To insert titles, either choose the appropriate CHART LAYOUT and give appropriate titles, or add each title using the appropriate tab. Get rid of the Legend and the Gridlines.



	A	B
1	**Quantitative Methods II**	
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5		
6	**Example 1**	
7	P(r = 2) =	0.2907
8	P(r ≤ 2) =	0.7752
9		
10	**Example 2**	
11	n =	25
12	p =	0.5
13		
14	r	P(r)
15	0	0.00000
16	1	0.00000
17	2	0.00001
18	3	0.00007
19	4	0.00038
20	5	0.00158
21	6	0.00528
22	7	0.01433
23	8	0.03223
24	9	0.06089
25	10	0.09742
26	11	0.13284
27	12	0.15498
28	13	0.15498
29	14	0.13284

Permutations and Combination | Binomial | Poisson and Normal

Poisson Probability distribution

Probabilities for the Poisson distribution are calculated in the same way as for the Binomial distribution. For example, suppose that the average number of *e*-mails received by a student is 9 per week. Let us find the probability of receiving exactly 11 *e*-mails during a week and the probability of receiving at most 11 *e*-mails during a week.

Go to Sheet 3 and rename it "Poisson and Normal". Make a heading similar to that of the previous sheets. Write "Poisson probabilities" and in cell A7 write "P(x = 11)" and in cell A8 write "P(x <= 11)". Find the value of both of these probabilities in cells B7 and B8 using the POISSON function.

Probability histograms for the Poisson distribution are done in the same way as for the Binomial Distribution.

Normal Probability distribution

Probabilities on a normal curve are done in the same way as for Binomial and Poisson probabilities and make use of the NORMDIST function, where CUMULATIVE is always TRUE.

Suppose that we have a normal distribution with $\mu = 50$ and $\sigma = 4$.

In cell A10 write "Normal probabilities with $\mu = 50$ and $\sigma = 4$", in cell A11 write "P(x < 48) and in cell A12 write "P(47 < x < 53)". Evaluate these two probabilities in cells B11 and B12.

We can also find *z*-values. For example, suppose we want to find the 30th percentile for our distribution, then in cell A13 write 30th percentile, and in cell B13 find this using the function NORMINV.

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1	**Quantitative Methods II**			
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6	**Poisson Probabilities**			
7	P(x = 11) =	0.0970		
8	P(x ≤ 11) =	0.8030		
9				
10	**Normal promabilities with μ = 50 and σ = 4**			
11	P(x < 48) =	0.3085		
12	P(47 < x < 54) =	0.5467		
13	30th percentile	47.90		