Solutions to Quiz 1 Binomial and Normal Distributions 3−22−17 version 400

1) P(x< 25) implies P(x≤24)

Note: this boundary adjustment is due to discrete nature of binomial

n = 400 (max) p =0.6

macro $\text{binomCdf}(400,0.6,0,24) \approx 2.63031\text{E}^{-117}$

2) P(x≤224)

Note: NO boundary adjustment necessary

n = 400 (max) p =0.6

macro $\text{binomCdf}(400,0.6,224,400) \approx 0.953377$

3) P(x> 17) implies P(x≥18)

Note: this boundary adjustment is due to discrete nature of binomial

n = 400 (max) p =0.6

macro $\text{binomCdf}(400,0.6,18,400) \approx 1.$ This cannot be one because it is possible for this NOT to happen

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3) P(x> 17) implies P(x≥18)

Note: this boundary adjustment is due to discrete nature of binomial

n = 60 (max) p =0.3

macro $\text{binomCdf}(60,0.3,18,400) \approx 0.548564$

This cannot be one because it is possible for this NOT to happen

Since we are approximating binomial IT determines the boundaries and what we need to make the continuity correction on

Note: these boundary adjustments are due to using continuous to approximate discrete

n = 60 (max) p =0.3 q = 1−0.3 = 0.7

np = mean $= 60 \cdot 0.3 \blacktriangleright 18.$ SD $= \sqrt{npq} = \sqrt{60 \cdot 0.3 \cdot 0.7} \blacktriangleright 3.54965$

macro $\text{normCdf}(17.5,400.5,18,3.55) \approx 0.556004$

This cannot be one because it is possible for this NOT to happen

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4) P(x= 38)

n = 60 (max) p =0.6

macro $\text{binomPdf}(60,0.6,38) \approx 0.09246$

This cannot be zero because it is possible for this to happen

Since we are approximating binomial IT determines the boundaries and what we need to make the continuity correction on

Note: these boundary adjustments are due to using continuous to approximate discrete

n = 60 (max) p =0.6 q = 1−0.6 = 0.4

np = mean $=60\cdot 0.6 \blacktriangleright 36.$ SD $= \sqrt{npq} = \sqrt{60\cdot 0.6\cdot 0.4} \blacktriangleright 3.79473$

macro $\text{normCdf}(37.5,38.5,36,3.795) \approx 0.091302$

This cannot be zero because it is possible for this to happen

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ALL these problems are normally distributed, no adjustment of boundaries is necessary

mean = 1000 SD = 75

5) Usual range is within two standard deviations of the mean

Usual min $=1000-2\cdot 75 = 850$ Usual max $= 1000+2\cdot 75 = 1150$

Usual Range 850 to 1150

6) P(no more than 1100) = P(0<x<1100) $=\text{normCdf}(0,1100,1000,75) = 0.908789$

7) P(more than 985) =

P(985<x<1000000000000) $=\text{normCdf}(985,1000000000000,1000,75) = 0.57926$

8) P(between 950 and 1095) = P(950<x<1095) $=\text{normCdf}(950,1095,1000,75) = 0.64487$

9) P(x > VALUE 1) = 0.16 complement to VALUE 1 probability $1-0.16 = 0.84$

P(x < VALUE 1) =0.84 $\text{invNorm}(0.84,1000,75) = 1074.58$ =VALUE 1

10) P(x < VALUE 2) =0.48 $\text{invNorm}(0.48,1000,75) = 996.238$ =VALUE 2

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ALL these problems are binomially distributed, to make an approximation using normal distribution adjustment of boundaries is necessary

$n = 600$ $p = 0.82$ $q = 1 - 0.82 = 0.18$

for approximating normal mean $= 600 \cdot 0.82 = 492$. SD $= \sqrt{600 \cdot 0.82 \cdot 0.18} = 9.41063$

11) P(between and including 496,489) = P($489 \le x \le 496$)

binomial macro $=\text{binomCdf}(600, 0.82, 489, 496) = 0.329219$

normal macro $=\text{normCdf}(488.5, 496.5, 492, 9.411) = 0.328751$

12) P(more than 485) = P($486 \le x \le 600$)

binomial macro $=\text{binomCdf}(600, 0.82, 486, 600) = 0.756978$

normal macro $=\text{normCdf}(485.5, 600.5, 492, 9.411) = 0.755117$

13) P(between 498,510) = P($499 \le x \le 509$)

binomial macro $=\text{binomCdf}(600, 0.82, 499, 509) = 0.217388$

normal macro $=\text{normCdf}(498.5, 509.5, 492, 9.411) = 0.213407$

Solutions to Quiz 1 Binomial and Normal Distributions 3-22-17 version 400

ALL these problems are binomially distributed, to make an approximation using normal distribution adjustment of boundaries is necessary

$n = 600$ $p = 0.82$ $q = 1 - 0.82 = 0.18$

for approximating normal mean $= 600 \cdot 0.82$ SD $= \sqrt{600 \cdot 0.82 \cdot 0.18} = 9.41063$

14) P(at most 500) = $P(0 \le x \le 500)$

binomial macro $= \text{binomCdf}(600, 0.82, 0, 500) = 0.816268$

normal macro $= \text{normCdf}(-0.5, 500.5, 492, 9.411) = 0.81679$

15) P(exactly 497) = $P(x = 497)$

binomial macro $= \text{binomPdf}(600, 0.82, 497) = 0.037408$

normal macro $= \text{normCdf}(496.5, 497.5, 492, 9.411) = 0.036799$

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16)

Question 1 find p such that when n=600 binomial can be approximated using normal

$np \geq 5$ is the key $600p \geq 5$

$$\frac{600p}{600} \geq \frac{5}{600}$$

$p \geq \frac{5}{600} = \frac{1}{120}$ So as long as $p \geq \frac{1}{120.}$ or $p \geq 0.008333$

Question 2 find n such that when p=0.08 binomial can NOT be approximated using normal

$np \geq 5$ is the key $0.08n \geq 5$

$$\frac{0.08n}{0.08} \geq \frac{5}{0.08}$$ Note 62.5

$n \geq 62.5$ will allow you to approximate binomial with normal

So as long as $n < 62.5$ or n=62 is the largest size n that normal will not be allowed to approximate binomial

Problem 5

	A missed	B raw	C percent	D	E missed2	F raw2	G perce...	H	I	J	K	L	M
=		=23−miss	=raw/(0.2			=23−miss	=raw2/(0.						
1	0	23	100.		0.5	22.5	97.8261						
2	1	22	95.6522		1.5	21.5	93.4783						
3	2	21	91.3043		2.5	20.5	89.1304						
4	3	20	86.9565		3.5	19.5	84.7826						
5	4	19	82.6087		4.5	18.5	80.4348						
6	5	18	78.2609		5.5	17.5	76.087						
7	6	17	73.913		6.5	16.5	71.7391						
8	7	16	69.5652		7.5	15.5	67.3913						
9	8	15	65.2174		8.5	14.5	63.0435						
10	9	14	60.8696		9.5	13.5	58.6957						
11	10	13	56.5217		10.5	12.5	54.3478						
12	11	12	52.1739		11.5	11.5	50.						
13	12	11	47.8261		12.5	10.5	45.6522						
14	13	10	43.4783		13.5	9.5	41.3043						
15	14	9	39.1304		14.5	8.5	36.9565						
16	15	8	34.7826		15.5	7.5	32.6087						
17	16	7	30.4348		16.5	6.5	28.2609						
18	17	6	26.087		17.5	5.5	23.913						
19	18	5	21.7391		18.5	4.5	19.5652						
20	19	4	17.3913		19.5	3.5	15.2174						
21	20	3	13.0435		20.5	2.5	10.8696						

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