Problem 1

1) False Normal Distribution typically deals with ranges of values or strict inequalities

2) False if $np < 5$ or $nq < 5$, then you cannot use normal distribution to approximate binomial

3) True this is the continuity correction factor add 0.5 to max boundary and subtract 0.5 from min boundary

4) False, unlike binomial $P(x<2)$ and $P(x \leq 2)$ are the same

5) $np \geq 5$

6) $nq \geq 5$

Normally Distributed melon weights

mean = 1.8 SD = 0.3

7) usual range is within 2 standard deviations of mean

$1.8-2\cdot 0.3 \blacktriangleright 1.2$ $1.8+2\cdot 0.3 \blacktriangleright 2.4$

these melons will typically run from 1.2 kg to 2.4 kg

8) P(x>2) $\text{normCdf}(2,1000000,1.8,0.3) = 0.252492$

9) P(x<1.75) $\text{normCdf}(0,1.75,1.8,0.3) = 0.433816$

10) P(1.6<x<1.9) $\text{normCdf}(1.6,1.9,1.8,0.3) = 0.378066$

11a) lowest 19% weight Xlow=$\text{invNorm}(0.19,1.8,0.3) \blacktriangleright 1.53663$

11b) highest 24% weight Xhigh =$\text{invNorm}(0.76,1.8,0.3) \blacktriangleright 2.01189$

11) the acceptable range of melons for this specialized grocery store is 1.567 kg to 2.012 kg

12) N = 56 p = 0.3

Find P(12) = P(x=12)

binomial $\text{binomPdf}(56,0.3,12) \blacktriangleright 0.045363$

for normal we need to find some things first

np = $56 \cdot 0.3 \blacktriangleright 16.8$ (since this is larger than 5, we can use normal to approximate)

q = $1-0.3 \blacktriangleright 0.7$ (since $nq = 56 \cdot 0.7 = 39.2$ and nq larger than 5 we can use normal to approximate)

SD = $\sqrt{56 \cdot 0.3 \cdot 0.7} \blacktriangleright 3.42929$

now we can build a macro to find P(x=12)

normal $\text{normCdf}(11.5,12.5,16.8,3.429) \blacktriangleright 0.043823$

13) N = 56 p = 0.03

Find P(x<17) = P(x≤16)

binomial $\text{binomCdf}(56,0.03,0,16)$ ▸ 1.

for normal we need to find some things first

np = $56 \cdot 0.03$ ▸ 1.68

since np is NOT larger than 5, we can't use normal to approximate binomial

14) N = 56 p = 0.09

Find P(x>5) = P(x≥6)

binomial $\text{binomCdf}(56,0.09,6,1000000) \blacktriangleright 0.391268$

for normal we need to find some things first

np = $56 \cdot 0.09 \blacktriangleright 5.04$ (since this is larger than 5, we can use normal to approximate)

q = $1-0.09 \blacktriangleright 0.91$ (since nq = $56 \cdot 0.91 = 50.96$ and nq larger than 5 we can use normal to approximate)

SD = $\sqrt{56 \cdot 0.09 \cdot 0.91} \blacktriangleright 2.14159$

now we can build a macro to find P(x> 6)

normal $\text{normCdf}(5.5,100000,5.04,2.142) \blacktriangleright 0.41498$

n = 100 p = 0.80

15) find P(x=75) or P(75)

binomial $\text{binomPdf}(100,0.8,75) \blacktriangleright 0.043878$

for normal we need to find some things first

np = $100 \cdot 0.8 \blacktriangleright 80.$ (since this is larger than 5, we can use normal to approximate)

q = $1-0.8 \blacktriangleright 0.2$ (since nq = $100 \cdot 0.2 = 20.$ and nq larger than 5 we can use normal to approximate)

SD = $\sqrt{100 \cdot 0.8 \cdot 0.2} \blacktriangleright 4.$

now we can build a macro to find P(x=75)

normal $\text{normCdf}(74.5,75.5,80,4) \blacktriangleright 0.045729$

n = 100 p = 0.80

16) find $P(x \leq 78)$

binomial $\text{binomCdf}(100,0.8,0,78) \blacktriangleright 0.345967$

for normal we need to find some things first

np = $100 \cdot 0.8 \blacktriangleright 80.$ (since this is larger than 5, we can use normal to approximate)

q = $1-0.8 \blacktriangleright 0.2$ (since nq = $100 \cdot 0.2 = 20.$ and nq larger than 5 we can use normal to approximate)

SD = $\sqrt{100 \cdot 0.8 \cdot 0.2} \blacktriangleright 4.$

now we can build a macro to find $P(x \leq 78)$

normal $\text{normCdf}(-0.5,78.5,80,4) \blacktriangleright 0.35383$

n = 100 p = 0.80

17) find $P(x>77) = P(x\geq 78)$

binomial $\text{binomCdf}(100,0.8,78,100) \blacktriangleright 0.738933$

for normal we need to find some things first

np = $100\cdot 0.8 \blacktriangleright 80.$ (since this is larger than 5, we can use normal to approximate)

q = $1-0.8 \blacktriangleright 0.2$ (since nq = $100\cdot 0.2 = 20.$ and nq larger than 5 we can use normal to approximate)

SD = $\sqrt{100\cdot 0.8\cdot 0.2} \blacktriangleright 4.$

now we can build a macro to find $P(x\leq 78)$

normal $\text{normCdf}(77.5,100.5,80,4) \blacktriangleright 0.734014$

n = 100 p = 0.80

17) find $P(70 \le x \le 81)$

binomial $\text{binomCdf}(100, 0.8, 70, 81) \blacktriangleright 0.631854$

for normal we need to find some things first

np = $100 \cdot 0.8 \blacktriangleright 80.$ (since this is larger than 5, we can use normal to approximate)

q = $1 - 0.8 \blacktriangleright 0.2$ (since nq = $100 \cdot 0.2 = 20.$ and nq larger than 5 we can use normal to approximate)

SD = $\sqrt{100 \cdot 0.8 \cdot 0.2} \blacktriangleright 4.$

now we can build a macro to find $P(x \le 78)$

normal $\text{normCdf}(69.5, 81.5, 80, 4) \blacktriangleright 0.641837$