Problem 1

1) $P(7) = P(x = 7)$ $n = 12$ $p = 0.6$

Step 1) $q = 1-0.6 = 0.4$

Step 2) mean for normal $= 12 \cdot 0.6 = 7.2$ (this is greater than 5 so normal can be applied here)

SD for normal $= \sqrt{12 \cdot 0.6 \cdot 0.4} = 1.69706$

binomial binomPdf(12,0.6,7) = 0.22703

normal approximation normCdf(6.5,7.5,7.2,1.697) = 0.230171

2) $P(6) = P(x = 6)$ $n = 14$ $p = 0.4$

Step 1) $q = 1-0.4 \blacktriangleright 0.6$

Step 2) mean for normal $= 14 \cdot 0.4 = 5.6$ (this is greater than 5 so normal can be applied here)

SD for normal $= \sqrt{14 \cdot 0.4 \cdot 0.6} = 1.83303$

binomial binomPdf(14,0.4,6) = 0.206598

normal approximation normCdf(5.5,6.5,5.6,1.833) = 0.21004

3) P(at least 4) = $P(x \geq 4)$ n = 11 p = 0.5

Step 1) q = $1-0.5 \blacktriangleright 0.5$

Step 2) mean for normal $= 11 \cdot 0.5 = 5.5$ (this is greater than 5 so normal can be applied here)

SD for normal $= \sqrt{11 \cdot 0.5 \cdot 0.5} = 1.65831$

binomial binomCdf(11,0.5,4,11) = 0.886719

normal approximation normCdf(3.5,11.5,5.5,1.658) = 0.885996

4) P(fewer than 5) = $P(x < 5)$ $P(x \leq 4)$ n = 13 p = 0.3

Step 1) q = $1-0.3 = 0.7$

Step 2) mean for normal $= 13 \cdot 0.3 = 3.9$

(this is less than than 5 so normal can NOT be applied here)

binomial binomCdf(13,0.3,0,4) = 0.654314

normal approximation DOES NOT MEET CRITERIA

5) P(more than 6) = P(x $\geq$7) n = 20 p = 0.24

Step 1) q = $1-0.24 = 0.76$

Step 2) mean for normal $= 20 \cdot 0.24 = 4.8$

(this is less than 5 so normal can NOT be applied here)

binomial $\text{binomCdf}(20,0.24,7,20) = 0.183831$

normal approximation DOES NOT MEET CRITERIA

6) P(more than 34) = P(x >34) P(x$\geq$35) n = 64 p = 0.5

Step 1) q = $1-0.5 = 0.5$

Step 2) mean for normal $= 64 \cdot 0.5 = 32.$

SD for normal $= \sqrt{64 \cdot 0.5 \cdot 0.5} = 4.$

binomial $\text{binomCdf}(64,0.5,35,64) = 0.266154$

normal approximation $\text{normCdf}(34.5,64.5,32,4) = 0.265985$

7) P(more than 350) = P(x ≥351) n = 400 p = 0.85

Step 1) q = $1-0.85 = 0.15$

Step 2) mean for normal $= 400 \cdot 0.85 = 340.$ (this is more than 5 so normal can be applied here)

SD for normal $= \sqrt{400 \cdot 0.85 \cdot 0.15} = 7.14143$

binomial binomCdf(400,0.85,351,400) = 0.067908

normal approximation normCdf(351.5,400.5,340,7.141) = 0.053653

8) mean = 165000 SD = 25000

P(x >Value 1) = 0.12 implies left area = $1-0.12 = 0.88$

x value 1 = invNorm(0.88,165000,25000) = 194375.

This the sales mark to exceed for the bonus

9) mean = 165000 SD = 25000

P(x <Value 2) = 0.05 implies left area = 0.05

x value 2 = invNorm(0.05,165000,25000) = 123879.

This the sales mark to avoid probation