1) a) $\frac{2}{3}$ b) 95% c) Almost all

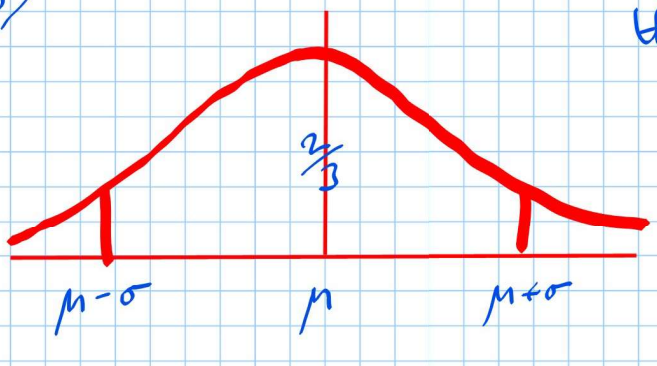
2) a) $X \sim B(200, 0.2)$

$np = 200 \times 0.2 = 40 > 5$

$p(1-p) = 200 \times 0.8 = 160 > 5$

$\therefore Y \sim N(40, 32)$ is a good approximation for X.

b)



the boundaries are $\underbrace{(40-\sqrt{32}, 40+\sqrt{32})}$ interval notation

(or $40-\sqrt{32} < Y < 40+\sqrt{32}$)

However, since we are using binomial approximations, our answers should be integers

$34 \leq X \leq 46$

↖ Use X as this was our original variable

3) a) $X \sim B(90, \frac{1}{6})$

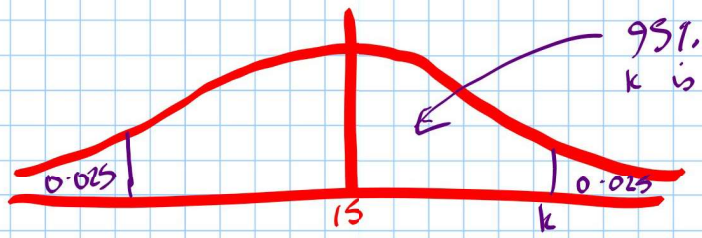
- Throws are independent of each other.
- Constant probability of throwing a 6.

b) $np > 5 \quad n(1-p) > 5$

$np = 90 \times \frac{1}{6} = 15 > 5$, $n(1-p) = 90 \times \frac{5}{6} = 75 > 5$

$\therefore Y \sim N(15, 12.5)$ is a good approximation

c)



95% of area lies in centre when k is 2σ from the mean

$\therefore k \approx 15 + 2\sqrt{12.5} \approx 22$