1) $p = 0.15$, $n = 100$, $x = 20$

Binomial distribution

$\therefore P(X = x) = {}^{n}C_{x}\, p^{x} (1-p)^{n-x}$

$P(x = 20) = {}^{100}C_{20} \times (0.15)^{20} \times (0.85)^{100-20}$

$= 0.04$

$= \boxed{4\%}$

2) $p = 0.75$, $n = 50$, $x = 35$

$P(X < 35) = \underline{0.163}$

3) $p = 0.2$, $n = 500$, $x_1 = 90$, $x_2 = 110$

$P(90 < x < 110) = \underline{0.735}$

4) $p = 0.7$, $n = 200$, $x = 140$

$P(x > 140) = \underline{0.4734}$

5) $p = 0.05$, $n = 200$, $x = 10$

$P(x < 10) = \underline{0.4547}$

6) Bernoulli distribution

$p = 0.7$

$x = 1 \rightarrow$ prefer chocolate ice cream

$P(X = 1) = p^{x} (1-p)^{1-x}$

$= (0.7)^{1} (1 - 0.7)^{1-1}$

$= \underline{0.7}$

7) $p = 0.02$, $n = 10000$, $x = 250$

$P(x \geq 250) = \underline{0.00032}$

8) $\mu_x = 69.2$, $\sigma_x = 2.9$

x – avg height of adult men aged ≥ 20 years in the US

$n = 50$

$P(\bar{x} > 70) = ?$

$\bar{X}$ – avg height of 50 males

$\bar{X} \sim N\left(69.2, \frac{2.9}{\sqrt{50}}\right) \Rightarrow \bar{X} \sim N(69.2, 0.41)$ (By CLT)

$P(\bar{x} > 70) = \underline{0.0256}$

9) x – avg salary of employees

$\mu_x = 75000$,

$\sigma_x = 10000$

$n = 100$

$P(\bar{x} < 72500) = ?$

By CLT, $\bar{X} \sim N\left(75000, \frac{10000}{\sqrt{100}}\right)$

$\Rightarrow \bar{X} \sim N(75000, 1000)$

where, $\bar{x}$ – mean of avg salary of 100 employees

$P(\bar{x} < 72500) = \boxed{0.0062}$

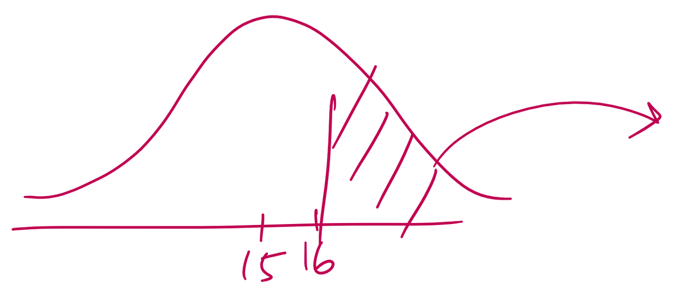
10) X – wait time for a table

$\mu_x = 15$, $\sigma_x = 3$

$X \sim N(15, 3)$

$n = 60$, $P(\bar{x} > 16) = ?$

By CLT, $\bar{X} \sim N\left(15, \frac{3}{\sqrt{60}}\right) \Rightarrow \bar{X} \sim N(15, 0.3873)$



$\boxed{P(\bar{x} > 16) = 0.0049}$