Assignment 7 of CISC 1006

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1

Calculate by Excel

1.1

$$P(X \geq 17) \approx 0.9849$$

1.2

$$P(X \leq 22) \approx 0.0912$$

1.3

$$\begin{aligned} P(32 \leq X \leq 41) =& P(X \leq 41) - P(X \leq 32) \\ \approx& 0.9666 - 0.6306 \\ =& 0.3360 \end{aligned}$$

1.4

$$\begin{aligned} P(X \leq x) =& 0.8 \\ x \approx& 35.0497 \end{aligned}$$

1.5

$$\begin{aligned} P(\mu - y \leq X \leq \mu + y) =& 0.75 \\ P(X \leq \mu - y) =& 0.125 \\ \mu - y \approx& 23.0979 \\ y =& 6.9021 \\ 23.0979 \leq X \leq& 36.9021 \end{aligned}$$

2

Calculate by Excel

$$X \sim N(10, 2^2)$$

$$\begin{aligned} P(X \leq x) =& 3 \\ x \approx& 6.2384 \end{aligned}$$

3

3.1

Calculate by Excel

$$\begin{aligned} X \sim & N(\mu, \sigma^2) \\ P(X > 1.3\sigma) = & 1 - P(X \leq 1.3\sigma) \\ \approx & 1 - 0.9032 \\ = & 0.0968 \end{aligned}$$

3.2

Calculate by Excel

$$\begin{aligned} X \sim & N(\mu, \sigma^2) \\ P(X < 0.52\sigma) \approx & 0.6985 \end{aligned}$$

4

4.1

$X \sim B(100, 0.8)$**, and since** $n = 100$ **is very large,** X **is approximiately** $N(80, 4^2)$

$$\begin{aligned} P(X < 75) = & P(X \leq 74)(binomoal) \\ = & P(X \leq 74.5)(normal) \\ \approx & 0.08457 \end{aligned}$$

4.2

$X \sim B(100, 0.7)$**, and since** $n = 100$ **is very large,** X **is approximiately** $N(70, \sqrt{21}^2)$

$$\begin{aligned} P(X \geq 75) = & 1 - P(X \leq 74.5) \\ \approx & 1 - 0.8370 \\ = & 0.1630 \end{aligned}$$

5

Let X **be the number of the customers that will show up.** $X \sim B(200, 0.98)$**, since** $n = 200$ **is vary large,** X **is approximiately** $Poisson(nq = 196)$

$$\begin{aligned} P(X > 197) = & P(X \geq 198) \\ = & 1 - P(X \leq 197.5) \\ \approx & 1 - 0.5473 \\ = & 0.4527 \end{aligned}$$