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Mon Tue Wed Thu Fri Sat Assignment: 04 تاریخ:

Statistics & probability Theory

(6.11)

$\sigma = 15$, $\mu = 200$

a) $P(x > 224)$

x_1

$$z_1 = \frac{x - \mu}{\sigma} = \frac{224 - 200}{15} \Rightarrow 1.6$$

$= P(z > 1.6) = 1 - P(z < 1.6)$

$= 1 - 0.9452 \Rightarrow 0.0548$

b) $P(191 < z < 209)$

Adding continuity factor

$P(191.5 < z < 208.5)$

$$z_1 = \frac{191.5 - 200}{15} = -0.56$$

$$z_2 = \frac{208.5 - 200}{15} = 0.56$$

$P(-0.56 < z < 0.56)$

$= P(z < 0.56) - P(z < -0.56)$

$= 0.7257 - 0.2743$

$= 0.4514$

Tue Wed Thu Fri Sat

Date: __/__/20

c) $x = 230, n = 1000, \mu = ?$

$P(z > 230)$

$1 - P(z < 230)$

$z_1 = \frac{230 - 200}{15} = 2$

$= 1 - P(z < 2) = 1 - 0.9772$

$= 0.0228$

$\mu = np = (1000)(0.0228) = 22.8$

d) $z = -0.67, x = ?$

$z = \frac{x - \mu}{\sigma}$

$\sigma z = x - \mu$

$\sigma z + \mu = x$

$x = (-0.67)(15) + 200$

$x = 189.95$

(6.15)

e) $\mu = 24, \sigma = 3.8$

$\frac{1}{2}$ hr = 30 min

$P(z \geq 0.5) = P(z \geq 30)$

$= 1 - P(z < 30)$

Tue Wed Thu Fri Sat Date: __/__/20__

$$z = \frac{30-24}{3.8} = 1.58$$

$P(z > 1.58)$

$1 - P(z < 1.58) = 0.0571$

or $1 - 0.9429 \Rightarrow 0.0571$

b) 8:45 - 9:00 = 15 min

$P(z > 15)$

$$= \frac{15-24}{3.8} = -2.37$$

$= 1 - 0.0089 = 0.9911$

c) $P(z > 25)$

$$= \frac{25-24}{3.8} = 0.26$$

$P(z > 0.26) = 1 - 0.6026$

$= 0.3974$

d) $x = ?$ $\quad 0.15 \rightarrow 1.04$

$x = \sigma z + \mu = (3.8)(1.04) + 24$

$= 27.95$

e) $n = 3, x = 2, p = 0.0571$

$b(2, 3, 0.0571) = \binom{3}{2} (0.0571)^2 (0.9429)$

$\Rightarrow 0.0092$

Mon Tue Wed Thu Fri Sat

(6.16)

$\mu = 99.61$, $\sigma = 0.08$

a) $P(99.5 < z < 99.7)$

$z_1 = \frac{99.5 - 99.61}{0.08} = -1.375$

$z_2 = \frac{99.7 - 99.61}{0.08} = 1.125$

$= P(z < 1.125) - P(z < -0.875)$

$= 0.8697 - 0.084$

$= 0.7852$

b) $P(z < z_k) = 0.05$

$= P(z < 1.645)$

$x = (1.645)(0.08) + 99.61$

$= 99.74$

(6.25)

$n = 100$, $p = 1\% \Rightarrow 0.01$

a) $P(X \leq 0)$

$\mu = np = (0.01)(100) = 1$

$\sigma = \sqrt{npq} = \sqrt{(0.01)(100)(0.99)}$

$= 0.995$

Mon Tue Wed Thu Fri Sat

تاریخ: _____

$$z = \frac{0.5 - 1}{0.995} = -0.503$$

$$P(z \leq -0.503) = 0.3085$$

b) $P = 0.05$

$$\mu = (100)(0.05) = 5$$

$$\sigma = \sqrt{npq} = \sqrt{(100)(0.05)(0.95)}$$

$$= 2.179$$

$$z = \frac{0.5 - 5}{2.179} = -2.06$$

$$P(X \leq 0) \simeq P(X \leq -2.06)$$

$$= 0.0197$$

(6.36)

$n = 200$

seats = 197

$$P(X \geq 3)$$

$$z = \frac{x - \mu}{\sigma} = \frac{3 - 0.5 - 4}{\sqrt{npq}}$$

$$= \frac{-1.5}{\sqrt{(200)(0.02)(0.98)}}$$

$$= -1.5/4.97 = 1 - P(X \geq 3)$$

$$= 1 - P(z > -0.76) = 0.2236$$

Wed Thu Fri Sat

Date: __/__/20

(6.37)

$\mu = 170, \quad \sigma = 30$

a) $P(X > 230)$

$$z = \frac{230 - 170}{30} = 2$$

$P(z > 2) = 1 - P(z < 2)$

$= 0.0228$

b) $n = 300, \quad P = 0.0228$ $\quad n > 30$

$\therefore$ Binomial approximation

$b(y, 300, 0.028)$

$\mu = (300)(0.0228) = 6.84$

$\sigma = \sqrt{(300)(0.0288)(1 - 0.0228)}$

$= 2.5854$

$$z = \frac{8 - 0.5 - 6.84}{2.5854} = 0.26$$

$P(X \geq 8) = P(z > 0.26)$

$\Rightarrow 0.3974$