Lista 6

① x = Resistencia a la Ruptura

$x \sim N(x, \mu = 100, \sigma^2 = 16)$

$\mu = 100$

$V(x) = 16$

$P(x > 95) = P\left(\frac{x-100}{4} > \frac{95-100}{4}\right) = P(z > -1.25) = .89$

$P(x \leq 95) = 1 - P(x > 95) = 1 - .8944 = .1056$

La Ganancia Esperada

$P(x > 95) \times 25 + P(x \leq 95) \times 10$

$= (.8944)(25) + .1056(10) = 23.4$

② x = Valulas con Presion de activacion

$x \sim N(x, 26, 4)$, $z_1 = \frac{20-26}{4} = -1.5$, $z_2 = \frac{32-26}{4} = 1.5$

$P(20 \leq x \leq 32) = (-1.5) \leq x \leq (1.5) = .8664$

③ x = Diametro del arbol

$D \sim N(x, \mu = 4, \sigma^2 = .01)$

Para ganar .5 se debe

$.05 < |D - 4| < .08$ → Desarrollando ||

$D - 4 > .05 = 4.05$ $\quad D - 4 < .08 = 4.08$

$-D + 4 > .05 = 3.95$ $\quad -D + 4 < .08 = 3.92$

$D > 4.05$ $\quad D < 3.95$

$P(x = 0.5) = P(.05 < |D - 4| < .08) = P(4.05 < D < 4.08) + P(3.92 < D < 3.95)$

$$= P\left[\frac{4.05-4}{.1} < z < \frac{4.06-4}{.1}\right] + P\left[\frac{3.92-4}{.1} < z < \frac{3.95-4}{.1}\right]$$

$$= P(.5 < z < .8) + P(-.8 < z < -.5)$$

$$(.0967 + .0967) = .1934$$

Para ganancia = 2

$$P(x=1) = P(|0-4| > .08) = (0-4) > .08$$

$$0-4 > .08 = 4.08$$

$$-0+4 > .08$$

$$0 < 3.92$$

$$P(|0-4| > .08) = P(0 > 4.08) + P(0 < 3.92)$$

$$= P\left(\frac{4.08-4}{.1}\right) + P\left(\frac{3.92-4}{.1}\right)$$

$$P(z > .8) + P(z < -.08) = .2119 + .2119 = .4238$$

$$E(x) = \sum(x)P(x) = 1(.4238) + (.5)(.1939) = .5205$$

(4) $x =$

$x \sim N(x, \mu, \sigma)$

- $P(x \leq \sigma) = 2P(x > c) = 2(1 - P(x \leq c))$

$P(x \leq c) + 2P(x \leq c) = 2$

$P(x \leq c) = \frac{2}{3}$

$$P\left(\frac{x-\mu}{\sigma} \leq \frac{c-\mu}{\sigma}\right) = \frac{2}{3}, \quad P\left(z \leq \frac{c-\mu}{\sigma}\right) = .66$$

entonces la acumulada es .66

$$\frac{c-\mu}{\sigma} = .43 \qquad c = .436 + \mu$$

(5) x = Diametro del cable

$x \sim N(x, .8, .0004)$

Este se considera defectuoso si $|x-\mu| > .025$

Probabilidad que sea defectuoso

$x - \mu > .025$

$-x + \mu > .025 \quad = \quad x - \mu < -.025$

$P(|x-\mu| > .025) = P(x-\mu > .025) + P(x-\mu < -.025)$

$z = \frac{.025}{.02} = 1.25 \qquad z = \frac{-.025}{.02} = -1.25$

$= (z > 1.25) + (z < -1.25)$

$= .1056 + .1056 = .2112$

(6) x = Daño a la carga

$x \sim N(x, \mu = 200, \sigma^2 = (30)^2)$

$z = \frac{100-200}{30}$

$P(x < 100) = \Phi(-3.3) = .0004$

$x \sim B(x, .0004)$

$P(x > 1) = 1 - P(x = 0)$

$= 1 - \binom{5}{0}(.0004)^0 (1-.0004)^5$

$(1 - .9980001) = .0019984000$

(7) x = Capacidad de Galones

$$z_1 = \frac{14-7-15}{.2} = -1.5 \qquad z_2 = \frac{15.1-15}{.2} = .5$$

$$P(x \le 14.7) = \Phi(-1.5) = .06146$$

$$P(x \le 15.1) = \Phi(.5) = .69146$$

$$P(14.7 \le x \le 15.1) = .69146 - .06681 = .6247$$

b) 25 millos por galon

1 — 25 millos

14.8 370

$$z = \frac{14.8-15}{.2} = -1$$

$$1 - P(x \le 14.8) = 1 - \Phi(-1) = 1 - .15866 = 84134$$

(8) x = Peso Paquete

$x \sim N(\mu = 10, \sigma^2 = 4)$

$$P(x \le c-1) = .99 \qquad z = \frac{c-10}{2} =$$

$$P\left(z \le \frac{c-1-10}{2}\right) = P\left(z < \frac{c-11}{2}\right) = .99 \qquad c = 2(z) + 10$$

$$\frac{c-11}{2} = 2.3 \qquad c = 15.66$$

(9) x = Resistencia de los resistores

$P(x < 9.671) = .05 \quad P(x > 10.256) = .10$

$P\left(z < \frac{9.671 - \mu}{\sigma}\right) = .05 \quad P\left(z > \frac{10.256 - \mu}{\sigma}\right) = .10$

al buscar en la tabla los valores de .05 y .10

$\frac{9.671 - \mu}{\sigma} = -1.645$ y $\frac{10.256 - \mu}{\sigma} = 1.28$

$9.671 - \mu = -1.645\sigma$ --① Restando ② de ①

$10.256 - \mu = 1.28\sigma$ --② $-.585 = -2.925\sigma$

sustituyendo en ① $\sigma = \frac{.585}{2.925} = .2$

$9.671 + 1.645(.02) = \mu = 10$ //

(10) x = tiempo de duracion de la lampara

$\mu = 400 \quad \sigma^2 = (40\text{ hrs})^2$

$P(x > 750) = 1 - P(x \leq 750)$

$z = \frac{750 - 800}{80} = -.625$

-5.59

$= 1 - .1894 = .8106$

$x \sim N(\mu = 400 - 400 = 0 \quad \sigma^2 = 40 + 40 = 80$

(11) x = Paginas de texto

$\sigma^2 = (15)^2$

$P(x \leq 100) = z \leq \frac{100-90}{15} = \Phi(.666) = .768$

$P(80 \leq x \leq 110) = \frac{80-90}{15} \leq z \leq \frac{110-90}{15}$

$= \Phi(-.666)\ \Phi(1.33) = .687$

x = manzanas consumidas por Hombres
Y = manzanas consumidas por Mujeres

(12) $Y = M$

M

$\mu = 19.9$

$\sigma^2 = (3.2)^2$

$x = H$

$\mu = 20.7$

$\sigma^2 = (11.56)^2$

$x \sim N(\mu = 20.7, \sigma^2 = 11.56^2$

$Y \sim N(\mu = 19.9, \sigma^2 = (3.2)^2$

$x - Y \sim N(\mu = 20.7 - 19.9,$

$\sigma^2 = 11.56 + 10.24)$

$\sigma = \sqrt{11.56 + 10.24} = 4.66$

$P(Y > x) = P(x - Y < 0)$

$P\left(\frac{x - Y - .8}{4.66} < \frac{0 - .08}{4.66}\right) = P(z < -.171324)$

$P(z > .1713) = 1 - \Phi(.171324) = .4325$

(13) x = longitud i-esimo Componente

$x \sim N(\mu = 2, \sigma^2 = (.02)^2)$

$P(5.7 \leq x \leq 6.3) = P\left(\frac{5.7 - 3(2)}{\sqrt{.12}} \leq z \leq \frac{6.3 - 6}{\sqrt{.12}}\right) =$

$P(-.86 \leq z \leq .86) = .6102 \times 100 = 61\%$

(15) x = invitacion a la conferencia

160 → 100

64 → 40

$x \sim N(x;\ \mu = .6(300),\ \sigma^2 = npq = 300(.4)(.6)$

72

180

64

38.4

$P(x < 150) = P(x < 150) = .0062$

$P(x > 160) = 1 - P(x < 160) = 1 - .9874 = .0125$