HW5 SOLUTION

Σ 15

1- $T \sim N(25, 16s^2)$

(1) a) $P(T \leq 20) = P\left(z \leq \frac{20-25}{4}\right) = P(z \leq -1.25)$

$= .1056$

(1) b) $P\left(z \leq \frac{30-25}{4}\right) = P(z \leq 1.25)$

$= .8944$

(1) c) $z_{.01} = 2.33$

99^{th} percentile $= 25 + (2.33)(4)$

$= 34.32$ sec.

2- $P(.496 \leq X \leq .504) = ?$

(2) $X \sim N(.499, (.002)^2)$

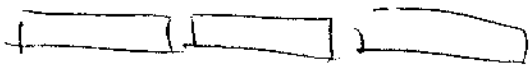
$P\left(\frac{.496-.499}{.002} \leq z \leq \frac{.504-.499}{.002}\right)$

$= P(-1.5 \leq z \leq 2.5) = \phi(2.5) - \phi(-1.5)$

$= .9938 - .0668$

$= .927$

$P(\text{not accepted}) = 1 - .927 = 0.073$



Total = T
Avg = $\bar{X}$

3- $P(\text{Total} > 48.25)$

a) $T \sim N(45, (3)(.0064))$

(1) $T \sim N(45, .0192)$

$$P(T > 48.25) = P\left(z > \frac{48.25 - 45}{\sqrt{.0192}}\right)$$

$$= P(z > 23.45) \leq .0002$$

(1)

b) $\bar{X} \sim N\left(15, \frac{.0064}{3}\right)$

$$P(\bar{X} > 12.50) = P\left(z > \frac{12.50 - 15}{\sqrt{.002133}}\right)$$

$$= P(z > -54.1266) \geq .9998$$

4) $E(\text{Life}) = (\alpha)(\beta) = 80$ week

(1)a) $V(\text{Life}) = (\alpha)(\beta)^2 = 1600$ week^2

(1)b) $P(\text{Life} > 100) = 1 - P(\text{Life} < 100)$

$$= 1 - F\left(\frac{100}{20}; 4\right) = 1 - .735 = .265$$

(1)

c) $P(\text{Life} < 50) = F\left(\frac{50}{20}; 4\right) = \frac{.143 + .353}{2} = .248$

5) # of customers in the next 2 hrs = 0

$P(0; \lambda t) = P(0; 5.2) = e^{-10} = 0.000045$

(1) a) $= \frac{(\lambda t)^x e^{-\lambda t}}{0!} = e^{-10}$ ✓

(1) b) $1 - P(0; \lambda t)$, $t = 3$

$1 - e^{-15} = 0.99999969$

6)

(1) a) $R = e^{-\left(\frac{60000 - 35000}{80000 - 35000}\right)^4} = 0.909137$

(2) b) # of broken (expected) = 909,137 cars

Cost = (300)(909,137) = $27,274,100

< $45M OK

Norm

Ceep