ASSIGNMENT #2

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K18-0363
Section D

5.1

Mean $= E(x)$

$E(x) = \sum_{i=1}^{k} x_i f(x_i)$

$F(x_i) = 1/k$

$E(x) = 1/k \sum_{i=1}^{k} x_i$

$S^2 = E(x^2) - (E(x))^2$

let $E(x) = \mu$

$E(x^2) = \sum_{i=1}^{k} x_i^2 F(x_i)$

$F(x_i) = 1/k$

$E(x^2) = 1/k \sum_{i=1}^{k} x_i^2$

$S^2 = 1/k \sum_{i=1}^{k} x_i^2 - \mu^2$

5.6

a) $P(2 \leq x \leq 5) = P(x=2) + P(x=3) + P(x=4) + P(x=5)$

$P = 0.5 \quad q = 0.5$

$6C_2 (0.5)^2 (0.5)^4 + 6C_3 (0.5)^3 (0.5)^3 + 6C_4 (0.5)^4 (0.5)^2 + 6C_5 (0.5)^5 (0.5)^1$

$\boxed{= 0.875}$

b) $P(x<3) = P(x=0) + P(x=1) + P(x=2)$

$6C_0 (0.5)^0 (0.5)^6 + 6C_1 (0.5)^1 (0.5)^5 + 6C_2 (0.5)^2 (0.5)^4$

$\boxed{= 0.344}$

PER3/2.

5.22

$P_r = 8/16 = 0.5$

$P_w = 4/16 = 0.25$

$P_b = 4/16 = 0.25$

Multinomial Distribution Function, $\frac{8!}{5!2!1!}(0.5)^5(0.25)^2(0.25)$

$= 0.082.$

5.32

a) $P(x=4) = \frac{7C_4 \times 3C_0}{10C_4} = 1/6$

b) $P(Y \leq 2) = P(Y=0) + P(Y=1) + P(Y=$

$= \frac{3C_0 \times 7C_4}{10C_4} + \frac{3C_1 + 7C_3}{10C_4} + \frac{7C_2 + 3C}{10C_4}$

$= 29/30.$

5.44

$g=3 \quad b=2 \quad r=4 \quad$ Total $=9$

$P = \frac{2C_2 \times 4C_1 \times 3C_2}{9C_5} + \frac{2C_2 \times 4C_2 \times 3C_1}{9C_5} + \frac{2C_2 \times 4C_3 \times 3C_0}{9C_5}$

$= 0.270$

REB 3/2.

5.53

a) Using poisson distribution: $e^{-\lambda} \times \frac{\lambda^n}{n!}$

$\lambda = 5$

$P(x > 5) = 1 - P(x \leq 5)$

$P(x \leq 5) = \sum_{i=0}^{5} \left(e^{-5} \times \frac{5^i}{i!} \right) = 0.615960$

$P(x > 5) = 1 - 0.615960$

$= 0.3840$

b) $P(X=0) = e^{-5} \times \frac{5^0}{0!} = 0.006738$

5.69

$\mu = np$

$\mu = 4000 \times 0.001$

$\mu = 4$

5.55

a) $(0.3)^2(0.7)$

$= 0.0630$

b) $P(x<4) = P(1 \leq x \leq 3)$

$P(x<4) = {}^0C_0(0.7)(0.3)^0 + {}^1C_0(0.7)(0.3) + {}^2C_0(0.7)(0.3)^2$

$= 0.9730$

PER 3/2.

5.80

a) $\lambda = 2.7$

poisson dist. $e^{-\lambda} \times \frac{\lambda^n}{n!}$

$P(x \leq 4) = \sum_{i=0}^{4} \left(e^{-2.7} \times \frac{2.7^i}{i!} \right)$

$= 0.863$

b) $P(x \leq 2) = \sum_{n=0}^{1} \left(e^{-2.7} \times \frac{2.7^n}{n!} \right)$

$= 0.249$

c) $P(x > 10) = 1 - P(x \leq 10)$

$P(x \leq 10) = \sum_{n=0}^{10} \left(e^{-2.75} \times \frac{(2.75 \times 5)^n}{n!} \right)$

$= 0.211226$

$P(x > 10) = 1 - 0.211226 = 0.789.$

5.84

a) $\lambda = 100$

$t = 3/100 = 0.05hr$

poisson dist $= e^{-\lambda t} \times \frac{(\lambda t)^n}{n!}$

$P(x=0) = e^{-1000 \times 0.05} \times \frac{(1000 \times 0.05)^0}{0!}$

$= 0.00674$

b) $P(x > 5) = 1 - P(x \leq 5)$

$= 1 - \sum_{i=0}^{5} \left(e^{-1000 \times 5} \frac{(1000 \times 0.05)^n}{n!} \right)$

$= 1 - 0.6159606548$

$= 0.384$

PER3/12.

6.5

a) $P(Z<-1.39) = 0.0823$

b) $P(Z>1.96) = 1-(Z<1.96) = 1-0.9750 = 0.025$

c) $P(-2.16<Z<-0.65) = P(Z<-0.65)-P(Z<-2.16) = 0.25-0.0154 = 0.2424$

d) $P(Z<1.43) = 0.9236$

e) $P(Z>-0.89) = 1-P(Z<-0.89) = 1-0.1867 = 0.8133$

f) $P(0.48<Z<1.74) = P(Z<1.74)-P(Z<0.48) = 0.9591-0.3156 = 0.6435$

6.7

a) $P(Z>K) = 0.2946$

$1-0.2946 = 0.7054$

$P(Z<K) = 0.7054$

$K = 0.54$

b) $P(Z<K) = 0.0427$

$K = -1.72$

c) $P(-0.93<Z<K) = 0.7235$

$P(Z<K) - P(Z<-0.93) = 0.7235$

$P(Z<K) = 0.7235 + P(Z<-0.93)$

$P(Z<K) = 0.7235 + 0.1762$

$P(Z<K) = 0.8997$

$K = 1.28$

PEB3/2.

6.13

a) $\mu = 40$ $\sigma = 6.3$

$P(x > 32) =$

$P\left(Z > \frac{32-40}{6.3}\right)$

$P(Z > -1.27)$

$P(Z < -1.27) = 0.1020$

$1 - 0.1020$

$= 0.8980$

b) $P(x < 28)$

$P(Z < 28-40/6.3)$

$P(Z < -1.90)$

$= 0.0281$

c) $P(37 < x < 49)$

$P\left(\frac{37-40}{6.3} < Z < \frac{49-40}{6.3}\right)$

$P(-0.476 < Z < 1.43)$

$P(Z < 1.43) - P(Z < -0.476)$

$0.9236 - 0.3156$

$= 0.6080$

PERB7/2.

10.35

T	2.1	5.3	1.4	4.6	0.9
NT	1.9	0.5	2.8	3.1	

$\alpha = 0.05$ $\quad H_0 = \mu_T = \mu_{NT}$

$H_1 = \mu_T > \mu_{NT}$

$n_T = 5$

$n_{NT} = 4.$

$$\bar{X}_T = \frac{\Sigma X_T}{n_T} = \frac{2.1+5.3+1.4+4.6+0.9}{5} = 2.86$$

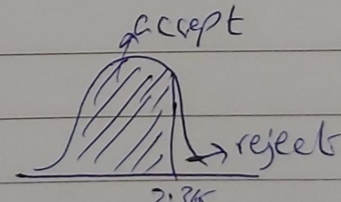
$$\bar{X}_{NT} = \frac{\Sigma X_{NT}}{n_{NT}} = \frac{1.9+0.5+2.8+3.1}{4} = 2.075$$

$$S_T^2 = \frac{\Sigma (X_T - \bar{X}_T)^2}{n_T - 1} = 3.883$$

$$S_{NT}^2 = \frac{\Sigma (X_{NT} - \bar{X}_{NT})^2}{n_{NT} - 1} = 1.3625$$

$$t = \frac{(\bar{X}_T - \bar{X}_{NT}) - (\mu_T - \mu_{NT})}{\sqrt{\frac{(n_T - 1) S_T^2 + (n_{NT} - 1) S_{NT}^2}{n_T + n_{NT} - 2}} \times \sqrt{\frac{1}{n_T} + \frac{1}{n_{NT}}}}$$

$t = 0.69898$. $\quad$ C.V = +2.365



t value < C.V hence accep H_0.

Hence $\mu_T = \mu_{NT}$ → Serum is effective.

PEB3/2.

10.45 $H_0 = \mu_R = \mu_B$; $\mu_D = 0$ $H_1 \cdot \mu_R > \mu_B$ $\alpha = 0.05$

Car	Difference	$Difference^2$
1	0.1	0.01
2	-0.2	0.04
3	0.4	0.16
4	0.1	0.01
5	-0.1	0.01
6	0.1	0.01
7	0	0
8	0.2	0.04
9	0.5	0.25
10	0.2	0.04
11	0.1	0.01
12	0.3	0.09
	$\Sigma D = 1.7$	$\Sigma D^2 = 0.76$

$\bar{D} = 1.7/12 = 0.1417$

$S_D = \sqrt{\dfrac{12 \times 0.76 - (1.7)^2}{12 \times 11}} = 0.217$

$t = \dfrac{\bar{D} - \mu_D}{S_D/\sqrt{n}}$ $\therefore$ reject H_0.

$= 2.2668$

$d.F = 12 - 1 = 11$

P Value $= 0.0153$

P Value $< \alpha$

$0.0153 < 0.05$

RE8/12.

10.25

$H_0: \mu = 10$ $\quad n = 10$ $\quad \bar{x} = \frac{\Sigma x}{n}$ $\quad \bar{x} = 10.06$

$H_1: \mu \neq 10$ $\quad \alpha = 0.01$

$s^2 = 0.0604$

$s = 0.246$

$$t = \frac{\bar{x} - \mu}{s/\sqrt{n}}$$

$= 0.77$

Critical Value = 3.250

accept H_0

10.41

$H_0: \mu_1 > \mu_2$ $\quad$ claim = Avg densities are same.

$H_1: \mu_1 \neq \mu_2$

$\alpha = 0.05$ $\quad n_1 = 16 \quad n_2 = 12$

$\bar{x}_1 = 9897.5 \quad \bar{x}_2 = 4120.8$

$S_1^2 = 62005072 \quad S_2^2 = 6147920.25$

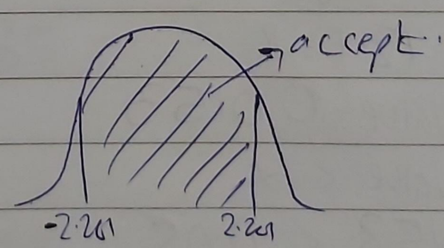
$$t = \frac{9897.5 - 4120.8 - 0}{\sqrt{\frac{62005072}{16} - \frac{6147920.25}{12}}}$$

$= 2.7578$

$t = 2.76$

C.V = 2.201, -2.201

t. Value > C.V. reject H_0.



PERB/12.

13.32

H_0: All means are equal.
H_1: Atleast 1 mean is different.

	A	B	C
Total	91.340	82.508	98.04
Total^2	8342.996	6807.570	9611.842
SS of y_{ij}	898.858	844.064	1602.058

Grand Total = 271.88
G.T of SS of y_{ij} = 3344.980
G.T of total^2 = 73923.08454
Correlation Factor = 73923.08454/36 = 2053.420.

PER3/12.