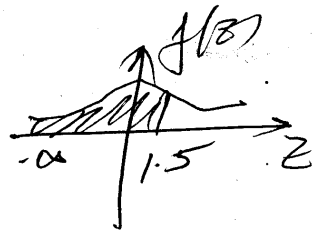
Navlakhi's

Tel: 9820246760 / 9769479368

① (a) $P(z < 1.5)$

$= P(-\infty < z < 1.5)$

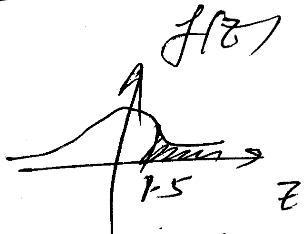


$= P(-\infty < z < 0) + P(0 < z < 1.5)$

$= 0.5 + 0.4332$

$= 0.9332$

(b) $P(z > 1.5)$



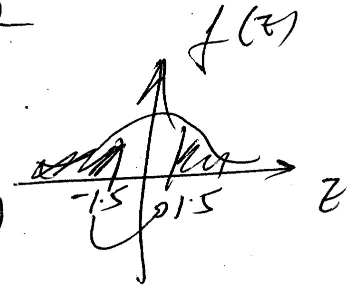
$= P(1.5 < z < \infty)$

$= P(0 < z < \infty) - P(0 < z < 1.5)$

$= 0.5 - 0.4332$

$= 0.0668$

(c) $P(z < -1.5)$

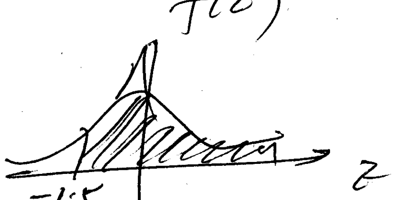


$= P(-\infty < z < -1.5)$

$= P(1.5 < z < \infty)$

$= 0.0668$

(d) $P(z > -1.5)$



$= P(-1.5 < z < \infty)$

$= P(-1.5 < z < 0) + P(0 < z < \infty)$

$= P(-1.5 < z < 0) + P(0 < z < \infty)$

$= P(0 < z < 1.5)$

$= 0.4332 + 0.5$

$= 0.9332$

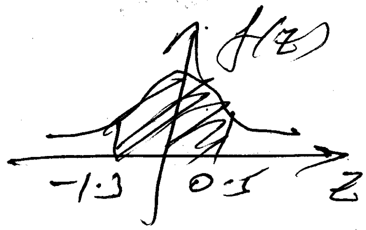
Best One Can Get

(2) $P(-1.3 < z < 0.5)$

$= P(0 < z < 1.3)$
$+ P(0 < z < 0.5)$

$= 0.4032 + 0.1915$

$= 0.5947$



(3) $N = 1000,\ \mu = 14,\ \sigma = 2.5$

(a) $P(12 < x < 15)$

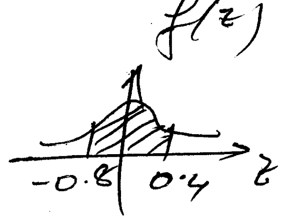
$= P\left(\frac{12-14}{2.5} < z < \frac{15-14}{2.5}\right)$

$= P(-0.8 < z < 0.4)$

$= P(0 < z < 0.8) + P(0 < z < 0.4)$

$= 0.2881 + 0.1554$

$= 0.4435$



No. of students who score between 12 & 15

$= 1000 \times 0.4435$

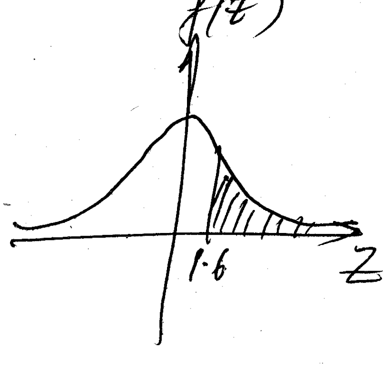
$= 444$

(b) $P(x > 18)$

$= P(18 < x < \infty)$

$= P\left(\frac{18-14}{2.5} < z < \infty\right)$

$= P(1.6 < z < \infty)$



$= P(0 < z < \infty) - P(0 < z < 1.6)$

$= 0.5 - 0.4452$

$= 0.0548$

$\therefore$ No. of students scoring more than 18

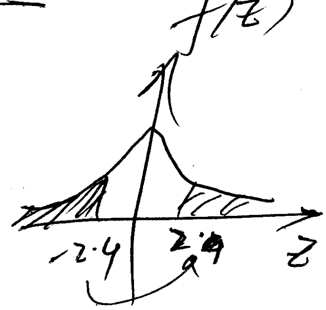
$= 1000 \times 0.0548$

$=$ 55 students.

(c) $P(x < 8)$

$= P(-\infty < x < 8)$

$= P\left(-\infty < z < \frac{8-14}{2.5}\right)$



$= P(-\infty < z < -2.4)$

$= P(2.4 < z < \infty)$

$= P(0 < z < \infty) - P(0 < z < 2.4)$

$= 0.5 - 0.4918$

$= 0.0082$

$\therefore$ No. of students scoring below 8

$=$ 8 student

(d) $x = 16$

$P(16) = \frac{1}{2.5\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{16-14}{2.5}\right)^2}$

$= 0.1159$

$\therefore$ No. of students scoring 16 $=$ 116 students

(4) $P(X<45)=0.3$

$P(-\infty<X<45)=0.3$

$P\left(-\infty<Z<\frac{45-\mu}{\sigma}\right)=0.3$

$P\left(\frac{\mu-45}{\sigma}<Z<\infty\right)=0.3$

$P(0<Z<\infty)-P\left(0<Z<\frac{\mu-45}{\sigma}\right)=0.3$

$0.5-0.3=P\left(0<Z<\frac{\mu-45}{\sigma}\right)$

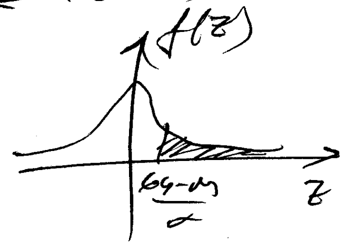
$P\left(0<Z<\frac{\mu-45}{\sigma}\right)=0.2$

$\therefore \frac{\mu-45}{\sigma}=0.52$ — (1)

$P(X>64)=0.08$

$P(64<X<\infty)=0.08$

$P\left(\frac{64-\mu}{\sigma}<Z<\infty\right)=0.08$



$P(0<Z<\infty)-P\left(0<Z<\frac{64-\mu}{\sigma}\right)=0.08$

$0.5-0.08=P\left(0<Z<\frac{64-\mu}{\sigma}\right)$

$P\left(0<Z<\frac{64-\mu}{\sigma}\right)=0.42$

$\therefore \frac{64-\mu}{\sigma}=1.41$ — (2)

from (1) & (2)

$\mu=50.12$

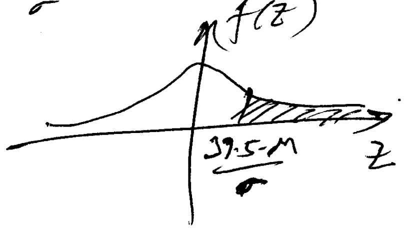
$\sigma=9.84$

(5) $P(X \geq 40) = 0.45$

$P(X > 39.5) = 0.45$

$P(39.5 < X < \infty) = 0.45$

$P\left(\frac{39.5-m}{\sigma} < z < \infty\right) = 0.45$



$P(0 < z < \infty) - P\left(0 < z < \frac{39.5-m}{\sigma}\right) = 0.45$

$0.5 - 0.45 = P\left(0 < z < \frac{39.5-m}{\sigma}\right)$

$P\left(0 < z < \frac{39.5-m}{\sigma}\right) = 0.05$

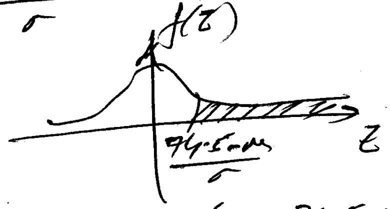
$\therefore \frac{39.5-m}{\sigma} = 0.13$ — (1)

$P(X \geq 75) = 0.09$

$P(X > 74.5) = 0.09$

$P(74.5 < X < \infty) = 0.09$

$P\left(\frac{74.5-m}{\sigma} < z < \infty\right) = 0.09$



$P(0 < z < \infty) - P\left(0 < z < \frac{74.5-m}{\sigma}\right) = 0.09$

$0.5 - 0.09 = P\left(0 < z < \frac{74.5-m}{\sigma}\right)$

$P\left(0 < z < \frac{74.5-m}{\sigma}\right) = 0.41$

$\therefore \frac{74.5-m}{\sigma} = 1.34$ → (2)

Solving (1) & (2)

$m = 35.74$

$\sigma = 28.33$

(6) $Ce^{-\frac{1}{24}(x^2-6x+4)}$

$Ce^{-\frac{1}{2}\cdot\frac{1}{12}[(x-3)^2-5]}$

$Ce^{+\frac{5}{24}} e^{-\frac{1}{2}\left(\frac{x-3}{\sqrt{12}}\right)^2}$

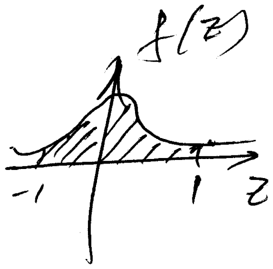
Comparing with the standard eqn we get

$m = 3$ & $\sigma = \sqrt{12}$

(7) (a) $P(m-\sigma \le x \le m+\sigma)$

$= P\left(\frac{m-\sigma-m}{\sigma} < z < \frac{m+\sigma-m}{\sigma}\right)$

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



$= 2P(0 < z < 1)$

$= 2(0.3413)$

$= 0.6826$

$\therefore$ 68.26% population is betn $m-\sigma$ & $m+\sigma$

7(b) $P(\mu - 2\sigma < X < \mu + 2\sigma)$

$= P\left(\frac{\mu - 2\sigma - \mu}{\sigma} < Z < \frac{\mu + 2\sigma - \mu}{\sigma}\right)$

$= P(-2 < Z < 2)$

$= 2P(0 < Z < 2)$

$= 2(0.4772)$

$= 0.9544$

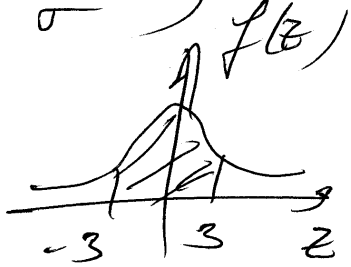
$\therefore$ 95.44% of population is between $\mu - 2\sigma$ & $\mu + 2\sigma$

(c) $P(\mu - 3\sigma < X < \mu + 3\sigma)$

$= P\left(\frac{\mu - 3\sigma - \mu}{\sigma} < Z < \frac{\mu + 3\sigma - \mu}{\sigma}\right)$

$= P(-3 < Z < 3)$

$= 2P(0 < Z < 3)$



$= 2(0.4987)$

$= 0.9974$

$\therefore$ 99.74% population is between $\mu - 3\sigma$ & $\mu + 3\sigma$

(d) $P(\mu - \sigma < x < \mu + 3\sigma)$

$= P\left(\frac{\mu - \sigma - \mu}{\sigma} < z < \frac{\mu + 3\sigma - \mu}{\sigma}\right)$

$= P(-1 < z < 3)$

$= P(0 < z < 1) + P(0 < z < 3)$

$= 0.3413 + 0.4987$

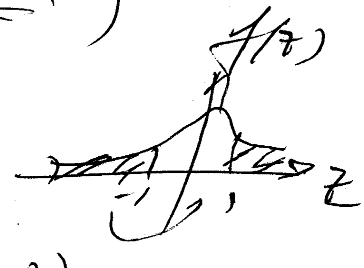
$= 0.84$

$\therefore$ 84% population lies betn $\mu - \sigma$ & $\mu + 3\sigma$

(e) $P(-\infty < x < \mu + \sigma)$

$= P\left(-\infty < z < \frac{\mu - \sigma - \mu}{\sigma}\right)$

$= P(-\infty < z < -1)$



$= P(1 < z < \infty)$

$= P(0 < z < \infty) - P(0 < z < 1)$

$= 0.5 - 0.3413$

$= 0.1587$

$\therefore$ 15.87% population is betn $-\infty$ & $\mu + \sigma$.

P9. $m = 65$

$\sigma = 10$

$P(60 \le x \le 69) = ?$

$P(59.5 < x < 69.5) = P\left(\frac{59.5-65}{10} < z < \frac{69.5-65}{10}\right)$

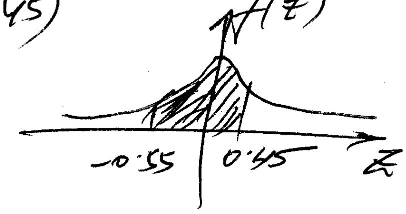
$= P(-0.55 < z < 0.45)$

$= P(0 < z < 0.55)$

$+ P(0 < z < 0.45)$

$= 0.2088 + 0.1736$

$= \underline{0.3824}$



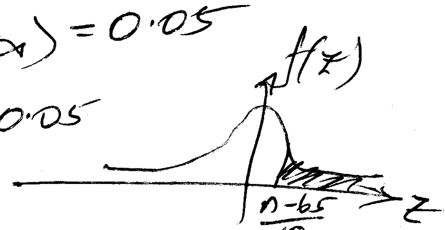
$P(X > n) = 0.05$

X ← student getting distinction

n ← distinction mark

$P(n < x < \infty) = 0.05$

$P\left(\frac{n-65}{10} < z < \infty\right) = 0.05$



$P(0 < z < \infty) - P\left(0 < z < \frac{n-65}{10}\right) = 0.05$

$0.5 - 0.05 = P\left(0 < z < \frac{n-65}{10}\right)$

$\therefore P\left(0 < z < \frac{n-65}{10}\right) = 0.45$

$\frac{n-65}{10} = 1.65 \quad \therefore n = 81.5$

$\therefore$ Dist. mark $= 82$

P10. $n = 500$ $p = 1/2$ $\mu = np = 250$

$\sigma = \sqrt{npq} = 11.18$

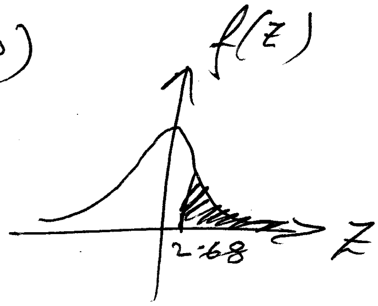
$P(X > 280)$

$= P(280 < X < \infty)$

$= P\left(\frac{280 - 250}{11.18} < Z < \infty\right)$

$= P(2.68 < Z < \infty)$

$= P(0 < Z < \infty) - P(0 < Z < 2.68)$



$= 0.5 - 0.4963$

$= 0.0037$

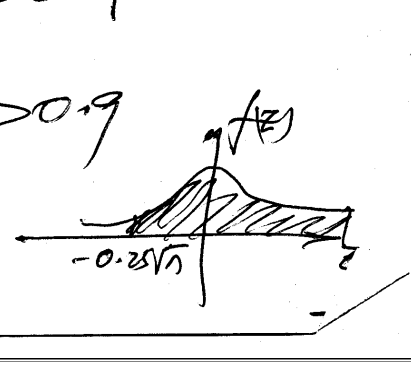
P.11. $p = 0.8$ $n = ?$ $q = 0.2$

$P(X > 0.7n) > 0.9$

$P(0.7n < X < \infty) > 0.9$

$P\left(\frac{0.7n - 0.8n}{\sqrt{0.16n}} < X < \infty\right) > 0.9$

$P(-0.25\sqrt{n} < X < \infty) > 0.9$



$P(0 < z < 0.25\sqrt{n}) + P(0 < z < \infty)$
$= 0.9$

$P(0 < z < 0.25\sqrt{n}) = 0.4$

$\therefore 0.25\sqrt{n} = 1.28$

$\therefore n = 26.21$

$\therefore$ Smallest no. of people $= 27$.

P12. $m = 25$
$\sigma = \sqrt{m} = 5$

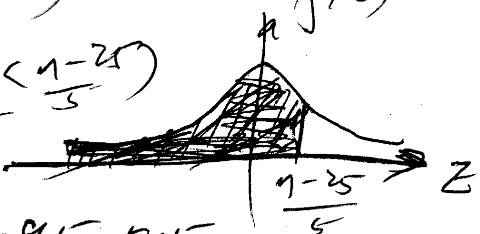
$P(X < n) > 0.95$

(X: net demand; n: no. of bottles)

$P(-\infty < X < n) > 0.95$

$P(-\infty < z < \frac{n-25}{5}) > 0.95$

$\therefore P(-\infty < z < 0) + P(0 < z < \frac{n-25}{5})$
> 0.95



$P(0 < z < \frac{n-25}{5}) > 0.95 - 0.5$

$P(0 < z < \frac{n-25}{5}) > 0.45$

$\therefore \frac{n-25}{5} > 1.65$

$\therefore n > 33.25$

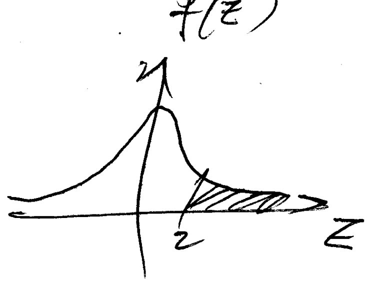
$\therefore$ Shopkeeper needs to stock 34 bottles

P.13 (a)

(i) $P(X \geq 20)$

$= P(20 \leq X \leq \infty)$

$= P\left(\frac{20-12}{4} \leq Z \leq \infty\right)$



$= P(2 \leq Z \leq \infty)$

$= P(0 < Z < \infty) - P(0 < Z < 2)$

$= 0.5 - 0.4772$

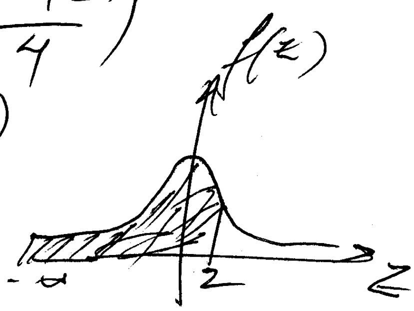
$= 0.0228$

(ii) $P(X \leq 20)$

$= P(-\infty \leq X \leq 20)$

$= P\left(-\infty \leq Z \leq \frac{20-12}{4}\right)$

$= P(-\infty \leq Z \leq 2)$



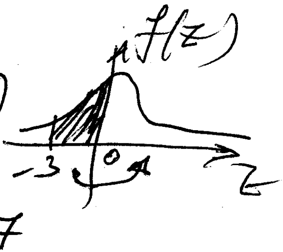
$= P(-\infty \leq Z \leq 0)$
$+ P(0 \leq Z \leq 2)$

$= 0.5 + 0.4772$

$= 0.9772$

(iii) $P(0 \leq X \leq 12)$

$= P\left(\frac{0-12}{4} \leq Z \leq \frac{12-12}{4}\right)$



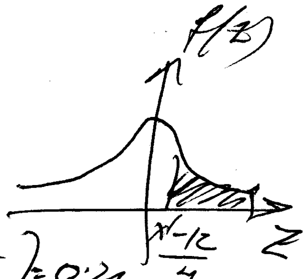
$= P(-3 \leq Z \leq 0)$

$= P(0 \leq Z \leq 3) = 0.4987$

(13) (b) $P(X > x') = 0.24$

$P(x' < X < \infty) = 0.24$

$P\left(\frac{x'-12}{4} < z < \infty\right) = 0.24$



$P(0 < z < \infty) - P\left(0 < z < \frac{x'-12}{4}\right) = 0.24$

$0.5 - P\left(0 < z < \frac{x'-12}{4}\right) = 0.24$

$P\left(0 < z < \frac{x'-12}{4}\right) = 0.26$

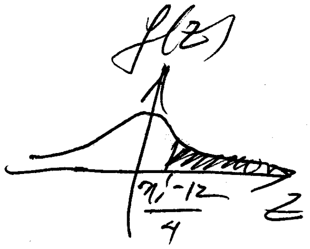
$\therefore \frac{x'-12}{4} = 0.71$

$\therefore x' = 14.84$

(c) $P(X > x_1') = 0.25$

$P(x_1' < X < \infty) = 0.25$

$P\left(\frac{x_1'-12}{4} < z < \infty\right) = 0.25$



$P(0 < z < \infty) - P\left(0 < z < \frac{x_1'-12}{4}\right) = 0.25$

$0.5 - P\left(0 < z < \frac{x_1'-12}{4}\right) = 0.25$

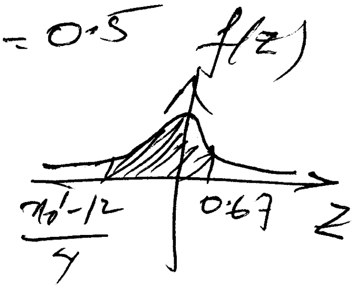
$\therefore P\left(0 < z < \frac{x_1'-12}{4}\right) = 0.25$

$\therefore \frac{x_1'-12}{4} = 0.67 \quad \therefore x_1' = 14.68$

$$P(x_0' < x < x_1') = 0.5$$

$$P\left(\frac{x_0' - 12}{4} < z < \frac{14.68 - 12}{4}\right) = 0.5$$

$$P\left(\frac{x_0' - 12}{4} < z < 0.67\right) = 0.5$$



$$P\left(0 < z < \frac{12 - x_0'}{4}\right) + P(0 < z < 0.67) = 0.5$$

$$\therefore P\left(0 < z < \frac{12 - x_0'}{4}\right) = 0.5 - 0.2486$$

$$P\left(0 < z < \frac{12 - x_0'}{4}\right) = 0.2514$$

$$\frac{12 - x_0'}{4} = 0.68$$

$$\therefore x_0' = \underline{9.28}$$

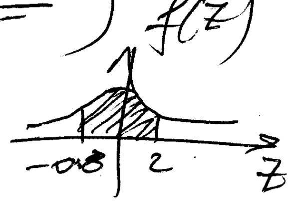
(14) $\mu = 30 \quad \sigma = 5$

(a) $P(26 \le x \le 40)$

$$= P\left(\frac{26-30}{5} \le z \le \frac{40-30}{5}\right)$$

$$= P(-0.8 \le z \le 2)$$

$$= P(0 \le z \le 0.8) + P(0 \le z \le 2)$$



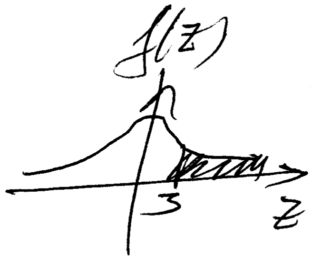
$= 0.2881 + 0.4772$

$= 0.7653$

(b) $P(X > 45)$

$= P(45 \le X \le \infty)$

$= P\left(\frac{45-30}{5} \le Z \le \infty\right)$



$= P(3 \le Z \le \infty)$

$= P(0 \le Z \le \infty) - P(0 \le Z \le 3)$

$= 0.5 - 0.4987$

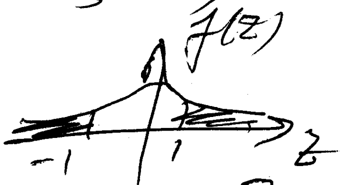
$= 0.0013$

(c) $P(|X-30| > 5)$

$= P(-5 > X-30 > 5)$

$= P(25 > X > 35)$

$= P\left(\frac{25-30}{5} > Z > \frac{35-30}{5}\right)$



$= P(-1 > Z > 1)$

$= 2P(1 < Z < \infty)$

$= 2[P(0 < Z < \infty) - P(0 < Z < 1)]$

$= 2[0.5 - 0.3413]$

$= \underline{0.3174}$

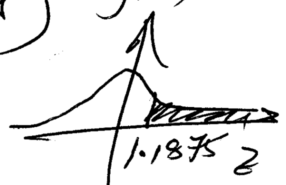
(15) $\mu = 662kg \quad \sigma = 32kg$

$N = 1,000$

(a) $P(X > 700)$

$= P(700 < X < \infty)$

$= P\left(\frac{700-662}{32} < Z < \infty\right)$



$= P(1.1875 < Z < \infty)$

$= P(0 < Z < \infty) - P(0 < Z < 1.1875)$

$= 0.5 - 0.3830$

$= 0.117$

No of ~~plates~~ plates with over 700 kg

yield $= 1000 \times 0.117$

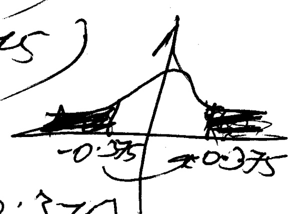
$= 117$ plates

(b) $P(X < 650)$

$= P(-\infty < X < 650)$

$= P\left(-\infty < Z < \frac{650-662}{32}\right)$

$= P(-\infty < Z < -0.375)$



$= P(0.375 < Z < \infty)$

$= P(0 < Z < \infty) - P(0 < Z < 0.375)$

$= 0.5 - 0.1480 = 0.352$

$\therefore$ No. of plates with under 650kg $= 1000 \times 0.352$

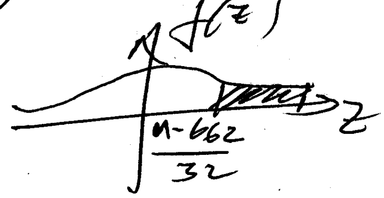
$= 352$ plates

(c) $1000 \times P(X > n) = 100$

$$P(X > n) = 0.1$$

$$P(n < X < \infty) = 0.1$$

$$P\left(\frac{n-662}{32} < z < \infty\right) = 0.1$$



$$\therefore P(0 < z < \infty) - P\left(0 < z < \frac{n-662}{32}\right) = 0.1$$

$$0.5 - 0.1 = P\left(0 < z < \frac{n-662}{32}\right)$$

$$\therefore P\left(0 < z < \frac{n-662}{32}\right) = 0.4$$

$$\therefore \frac{n-662}{32} = 1.28$$

$$\therefore n = 702.96 \text{ kg}$$

(16) $n = 600$ $\mu = np$

$p = 0.05$ $= 30$

$\sigma = \sqrt{npq} = 5.3385$

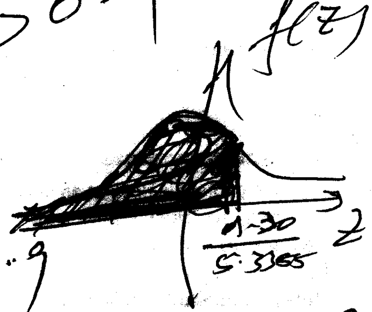
$P(X < n) > 0.9$

$P(-\infty < X < n) > 0.9$

$P\left(-\infty < Z < \frac{n-30}{5.3385}\right) > 0.9$

$\therefore P(-\infty < Z < 0)$

$+ P\left(0 < Z < \frac{n-30}{5.3385}\right) > 0.9$



$0.5 + P\left(0 < Z < \frac{n-30}{5.3385}\right) > 0.9$

$\therefore P\left(0 < Z < \frac{n-30}{5.3385}\right) > 0.4$

$\therefore \frac{n-30}{5.3385} > 1.28$

$\therefore n > 36.83$

$\therefore \underline{n = 37}$ copies

(17) $N = 10,000$

$\mu = 1000$

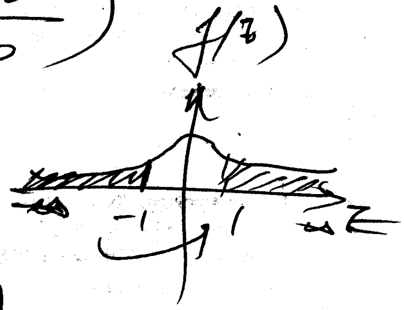
$\sigma = 200$

(a) $P(X < 800)$

$= P(-\infty < X < 800)$

$= P\left(-\infty < Z < \frac{800-1000}{200}\right)$

$= P(-\infty < Z < -1)$



$= P(1 < Z < \infty)$

$= P(0 < Z < \infty) - P(0 < Z < 1)$

$= 0.5 - 0.3413$

$= 0.1587$

$\therefore$ No of lamps failing in 1st 800 hrs

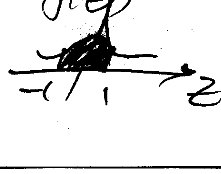
$= 10,000 \times 0.1587$

$= \underline{1587}$

(b) $P(800 < X < 1200)$

$= P\left(\frac{800-1000}{200} < Z < \frac{1200-1000}{200}\right)$

$= P(-1 < Z < 1)$



$= 2P(0 < Z < 1)$

$= 2 \times 0.3413 = 0.6826$

$\therefore$ No. of bulbs failing in 800 - 1200 hrs

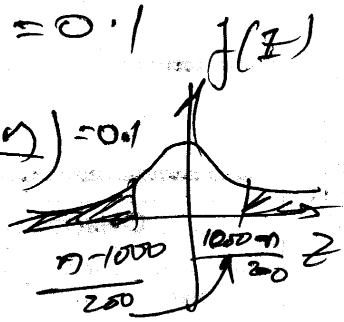
$= 10,000 \times 0.6826$

$= \underline{6826}$

(iv) $P(X < n) = 0.1$

$P(-\infty < X < n) = 0.1$

$P\left(-\infty < Z < \frac{n-1000}{200}\right) = 0.1$



$\Rightarrow P(0 < Z < \infty) - P\left(0 < Z < \frac{1000-n}{200}\right) = 0.1$

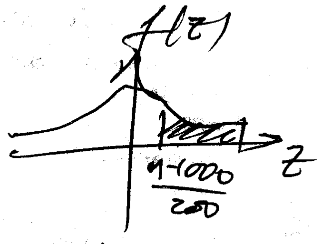
$0.5 - 0.1 = P\left(0 < Z < \frac{1000-n}{200}\right)$

$\therefore P\left(0 < Z < \frac{1000-n}{200}\right) = 0.4$

$\frac{1000-n}{200} = 1.28$

$\therefore n = 744$ hours

(v) $P(X > n) = 0.1$



$P(n < X < \infty) = 0.1$

$P\left(\frac{n-1000}{200} < Z < \infty\right) = 0.1$

$P(0 < Z < \infty) - P\left(0 < Z < \frac{n-1000}{200}\right) = 0.1$

$0.5 - 0.1 = P\left(0 < Z < \frac{n-1000}{200}\right)$

$0.4 = P\left(0 < Z < \frac{n-1000}{200}\right)$

$\therefore \frac{n-1000}{200} = 1.28 \Rightarrow \underline{n = 1256 \text{ hours}}$

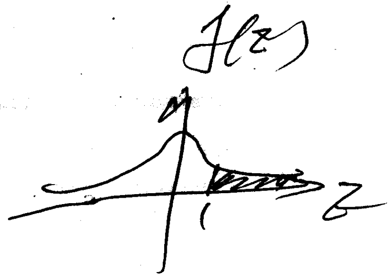
(18) $m = 65$

$\sigma = 5$

$P(x > 70)$

$= P(70 < x < \infty)$

$= P\left(\frac{70-65}{5} < z < \infty\right)$



$= P(+1 < z < \infty)$

$= P(0 < z < \infty) - P(0 < z < 1)$

$= 0.5 - 0.3413$

$= 0.1587$

$p = 0.1587$

$q = 0.8413$

$n = 3$

$r = 2$

$P(2) = {}^3C_2 (0.1587)^2 (0.8413)^1$

$= \underline{0.06357}$

(19) $m = 4 \quad \sigma = \sqrt{4} = 2$

$P(1.202 < x < 83180000)$

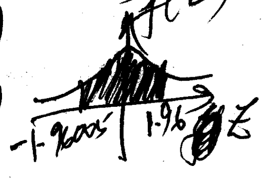
$= P(0.0799 < x' < 7.9200)$

$= P\left(\frac{0.0799 - 4}{2} < z < \frac{7.9200 - 4}{2}\right)$

$= P(-1.96005 < z < 1.96)$

$= P(0 < z < 1.96) + P(0 < z < 1.96005)$

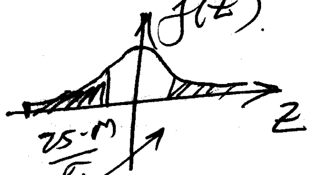
$= 0.4750 + 0.4750 = \underline{0.95}$



(20) $P(X < 25) = \frac{10.03}{100}$

$P(-\infty < X < 25) = 0.1003$

$P\left(-\infty < Z < \frac{25-M}{\sigma}\right) = 0.1003$



$P\left(\frac{M-25}{\sigma} < Z < \infty\right) = 0.1003$

$P(0 < Z < \infty) - P\left(0 < Z < \frac{M-25}{\sigma}\right) = 0.1003$

$0.5 - 0.1003 = P\left(0 < Z < \frac{M-25}{\sigma}\right)$

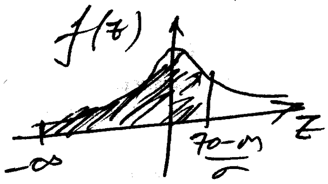
$\therefore P\left(0 < Z < \frac{M-25}{\sigma}\right) = 0.3997$

$\therefore \frac{M-25}{\sigma} = 1.28$ — (1)

$P(X < 70) = \frac{89.97}{100}$

$P(-\infty < X < 70) = 0.8997$

$P\left(-\infty < Z < \frac{70-M}{\sigma}\right) = 0.8997$



$P(-\infty < Z < 0) + P\left(0 < Z < \frac{70-M}{\sigma}\right) = 0.8997$

$P\left(0 < Z < \frac{70-M}{\sigma}\right) = 0.8997 - 0.5$

$P\left(0 < Z < \frac{70-M}{\sigma}\right) = 0.3997$

$\frac{70-M}{\sigma} = 1.28$ — (2)

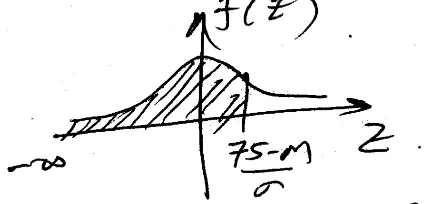
from (1) & (2)

$M = 47.5$
$\sigma = 17.578$

(Q1) $P(X<75) = 0.58$

$P(-\infty < X < 75) = 0.58$

$P\left(-\infty < Z < \frac{75-m}{\sigma}\right) = 0.58$



$P(-\infty < Z < 0) + P\left(0 < Z < \frac{75-m}{\sigma}\right) = 0.58$

$0.58 - 0.50 = P\left(0 < Z < \frac{75-m}{\sigma}\right)$

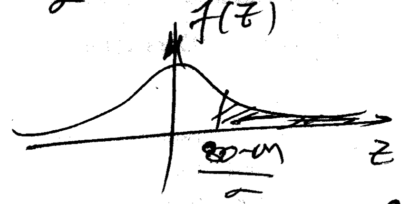
$P\left(0 < Z < \frac{75-m}{\sigma}\right) = 0.08$

$\therefore \frac{75-m}{\sigma} = 0.20$ — (1)

$P(X>80) = 0.04$

$P(80 < X < \infty) = 0.04$

$P\left(\frac{80-m}{\sigma} < Z < \infty\right) = 0.04$



$P(0 < Z < \infty) - P\left(0 < Z < \frac{80-m}{\sigma}\right) = 0.04$

$0.5 - 0.04 = P\left(0 < Z < \frac{80-m}{\sigma}\right)$

$\therefore P\left(0 < Z < \frac{80-m}{\sigma}\right) = 0.46$

$\therefore \frac{80-m}{\sigma} = 1.75$ — (2)

Solving (1) & (2)

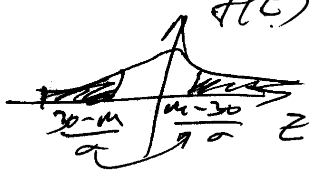
$m = 74.35$

$\sigma = 3.23$

(Q2) $P(X<30)=0.1$

$P(-\infty<X<30)=0.1$

$P\left(-\infty<Z<\frac{30-m}{\sigma}\right)=0.1$



$P(0<z<\infty)-P\left(0<z<\frac{m-30}{\sigma}\right)=0.1$

$0.5-0.1=P\left(0<z<\frac{m-30}{\sigma}\right)$

$P\left(0<z<\frac{m-30}{\sigma}\right)=0.4$

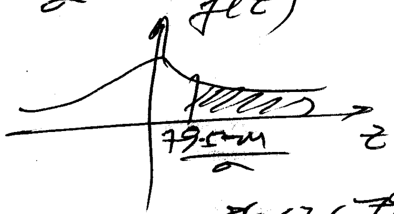
$\therefore \frac{m-30}{\sigma}=1.28$ — ①

$P(X\geq 80)=0.05$

$P(X>79.5)=0.05$

$P(79.5<X<\infty)=0.05$

$P\left(\frac{79.5-m}{\sigma}<z<\infty\right)=0.05$



$P(0<z<\infty)-P\left(0<z<\frac{79.5-m}{\sigma}\right)=0.05$

$0.5-0.05=P\left(0<z<\frac{79.5-m}{\sigma}\right)$

$P\left(0<z<\frac{79.5-m}{\sigma}\right)=0.45$

$\therefore \frac{79.5-m}{\sigma}=1.65$ — ②

From ① & ② $m=51.625$
$\sigma=16.894$

Prob. of 2nd class

$P(45<X<60)$

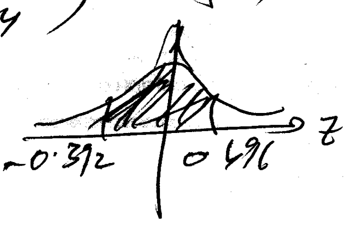
$=P\left(\frac{45-51.625}{16.894}<z<\frac{60-51.625}{16.894}\right)$

$=P(-0.392<z<0.496)$

$=P(0<z<0.392)+P(0<z<0.496)$

$=0.1517+0.1915$

$=0.3432$



(Q3) $n = 100$, $p = 0.4$

$\mu = 40$

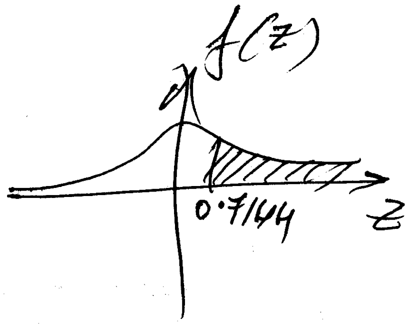
$\sigma = \sqrt{npq} = 4.8990$

(a) $P(X \geq 44)$

$= P(X > 43.5)$

$= P(43.5 < X < \infty)$

$= P\left(\frac{43.5 - 40}{4.8990} < Z < \infty\right)$



$= P(0.7144 < Z < \infty)$

$= P(0 < Z < \infty) - P(0 < Z < 0.7144)$

$= 0.5 - 0.2611$

$= 0.2389$

(b) $P(X = 44)$

$$= \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$$

$$= \frac{1}{4.8990(\sqrt{2\pi})} e^{-\frac{1}{2}\left(\frac{44-40}{4.8990}\right)^2}$$

$= 0.0583$