(6.9) $TC = 1000 + 2X$ X = number of units produced

$E(X) = 500$

$V(X) = 900$

$E(TC) = E(1000) + 2E(X)$

$= 1000 + 2(500) = 2000$

$V(TC) = V(1000) + 4V(X)$

$= 0 + 4(900) = 3600$

(6.10) $\Pi = 1000 - 2X$ $E(X) = 50$ X = number of units produced

$V(X) = 90$

$E(\Pi) = E(1000) - 2E(X)$

$= 1000 - 2(50) = 900$

$V(\Pi) = V(1000) + 4V(X)$

$= 0 + 4(90) = 360$

(6.11) $\Pi = 2000 - 2X$ $E(X) = 500$ X = number of units produced

$V(X) = 900$

$E(\Pi) = E(2000) - 2E(X) = 2000 - 2(500) = 1000$

$V(\Pi) = V(2000) + 4V(X) = 0 + 4(900) = 3600$

(6.12) $\Pi = 6000 - 3X$ $\quad E(X) = 1000$

$V(X) = 900$

$E(\Pi) = E(6000) - 3E(X) = 6000 - 3(1000) = 3000$

$V(\Pi) = V(6000) + 9V(X) = 0 + 9(900) = 8100$

(6.13) $P = 10{,}000 + 1.5X$ $\quad E(X) = 30{,}000$

$s(X) = 8{,}000$

$E(P) = 10{,}000 + 1.5E(X) = 10{,}000 + 1.5(30{,}000)$

$= 10{,}000 + 45{,}000 = 55{,}000$

$V(P) = 0 + (1.5)^2 V(X) = 2.25(64{,}000{,}000)$

$= 144{,}000{,}000$

$s(P) = \sqrt{144{,}000{,}000} = 12{,}000.$

(6.14) $TC = 20 + X$ $\quad E(X) = 4$ $\quad s(X) = 1$ $\quad E(\Pi) = .10E(TC)$

$\Pi = B - TC$

$E(\Pi) = B - E(TC)$

$.10E(TC) = B - E(TC)$

$1.1E(TC) = B$

$E(TC) = 20 + E(X)$

$= 20 + 4 = 24$

Then $1.1(24) = B$

$26.4 = B$

$V(T) = V(B) + V(TC)$ where $V(B) = 0$ (B is const.)

$V(TC) = V(30) + V(X)$

$= 0 + 1 = 1$

$= 0 + 1$

$s(T) = \sqrt{1} = 1$

(6.15) $W = 60 + (.20)M$ $\quad E(M) = 700$

$s(M) = 130$

$E(W) = 60 + (.20)E(M)$

$= 60 + (.20)(700) = 60 + 140 = 200$

$V(W) = 0 + (.20)^2 V(M) = (.04)(130)^2 = 676$

$s(W) = 26$

(6.16) $S = 6000 + (.08)O$ $\quad E(O) = 600,000$

$s(O) = 180,000$

$E(S) = 6000 + (.08)E(O) = 6000 + (.08)600,000 = 6000 + 48000$

$= 54,000$

$V(S) = 0 + (.08)^2 V(O) = .0064(180,000)^2 = 207360000$

$s(S) = \sqrt{207360000} = 14,400$

$V(T) = V(B) + V(TC)$ where $V(B) = 0$ (B is const.)

$V(TC) = V(20) + V(X)$

$= 0 + 1 = 1$

$= 0 + 1$

$s(T) = \sqrt{1} = 1$

6.15 $W = 60 + (.20)M$ $E(M) = 700$

$s(M) = 130$

$E(W) = 60 + (.20)E(M)$

$= 60 + (.20)(700) = 60 + 140 = 200$

$V(W) = 0 + (.20)^2 V(M) = (.04)(130)^2 = 676$

$s(W) = 26$

6.16 $S = 6000 + (.08)O$ $E(O) = 600,000$

$s(O) = 180,000$

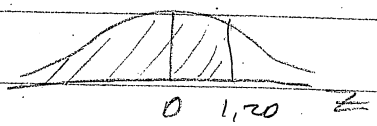
$E(S) = 6000 + (.08)E(O) = 6000 + (.08)600,000 = 6000 + 48000$

$= 54,000$

$V(S) = 0 + (.08)^2 V(O) = .0064(180,000)^2 = 207360000$

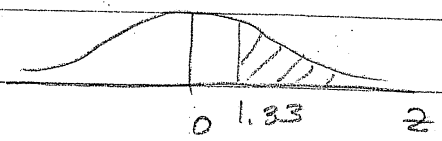
$s(S) = \sqrt{207360000} = 14,400$

6.17 a. $P(z < 1.20) = .8849$



b. $P(z > 1.33) = 1 - P(z < 1.33)$

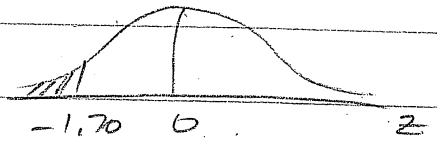
$= 1 - .9082 = .0918$



c. $P(z < -1.70) = P(z > 1.70)$

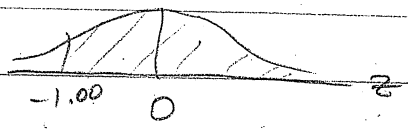
$= 1 - P(z < 1.70)$

$= 1 - .9554 = .0446$



d. $P(z > -1.00) = P(z < 1.00)$

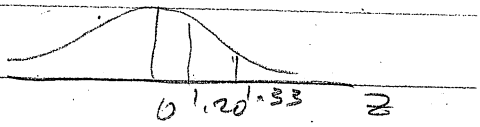
$= .8413$



e. $P(1.20 < z < 1.33)$

$= P(z < 1.33) - P(z < 1.20)$

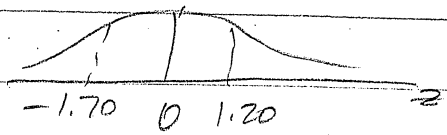
$= .9082 - .8849 = .0233$



f. $P(-1.70 < z < 1.20)$

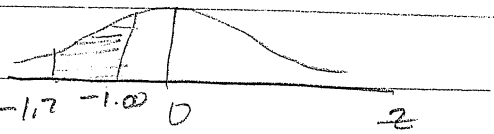
$= P(z < 1.20) - P(z < -1.70)$

$= .8849 - .0446 = .8403$



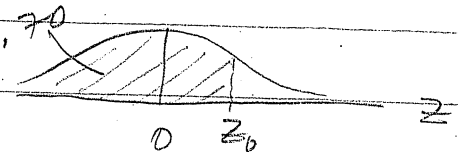
g. $P(-1.70 < z < -1.00)$

$= P(z < -1.00) - P(z < -1.70) = .1587 - .0446 = .1141$



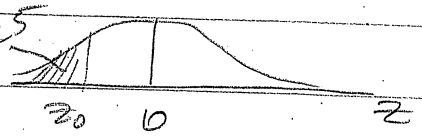
6.18 a. $P(z < z_0) = .70$

$z_0 = .52$



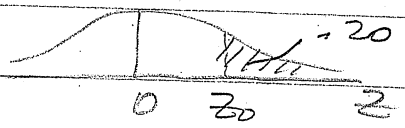
b. $P(z < z_0) = .25$

$z_0 = -.67$



c. $P(z > z_0) = .20$

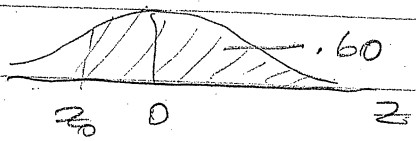
$z_0 = .84$



d. $P(z > z_0) = .60$

$P(z < z_0) = .40$

$z_0 = -.25$



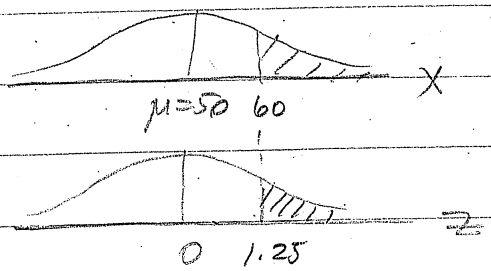
(6.19) $\mu = 50 \quad \sigma^2 = 64$

a. $P(x > 60) = P\left(z > \frac{60-50}{8}\right)$

$= P\left(z > \frac{10}{8}\right) - P(z > 1.25)$

$= 1 - P(z < 1.25) = 1 - .8944$

$= .1056$



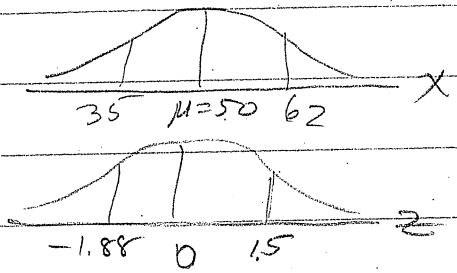
b. $P(35 < X < 62)$

$= P\left(\frac{35-50}{8} < z < \frac{62-50}{8}\right)$

$= P(-1.88 < z < 1.5)$

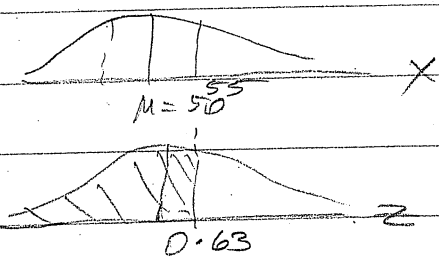
$= P(z < 1.5) - P(z < -1.88)$

$= .9332 - .0301 = .9031$



c. $P(X < 55) = P\left(z < \frac{55-50}{8}\right)$

$= P(z < .63) = .7357$



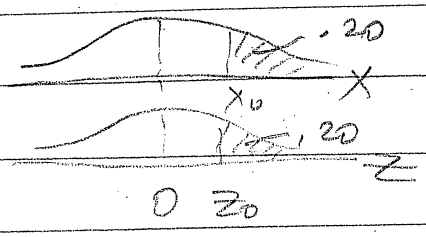
d. $P(x > x_0) = .20$

$P(z > z_0) = .20$

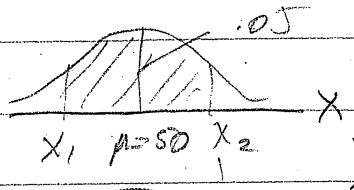
$P(z < z_0) = .80$

$z_0 = .84$

$x_0 = (.84)(8) + 50 = 56.72$

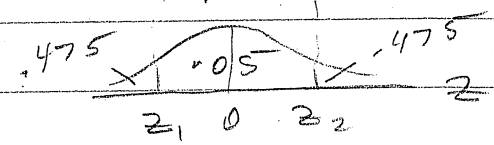


e. $P(X_1 < X < X_2) = .05$



$P(X < X_1) = .475$

$P(z < z_1) = .475$



$z_1 = -.06$

$X_1 = (-.06)(8) + 50 = 49.52$

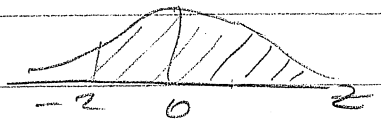
$P(z < z_2) = .525$

$z_2 = .06$

$X_2 = (.06)(8) + 50 = 50.48$

6-20 $\mu = 80 \quad \sigma^2 = 100$

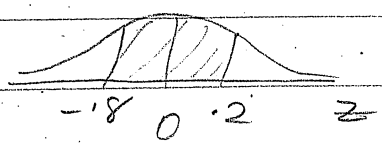
a. $P(X > 60) = P(z > \frac{60-80}{10})$



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

$= 1 - .0228 = .9772$

b. $P(72 < X < 82)$



$= P\left(\frac{72-80}{10} < z < \frac{82-80}{10}\right)$

$= P(-.8 < z < .2)$

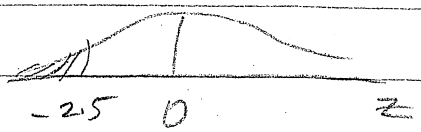
$= P(z < .2) - P(z < -.8) = .5793 - .2119 = .3674$

c. $P(X < 55)$

$= P\left(Z < \frac{55-80}{10}\right)$

$= P(Z < -2.5)$

$= .0062$



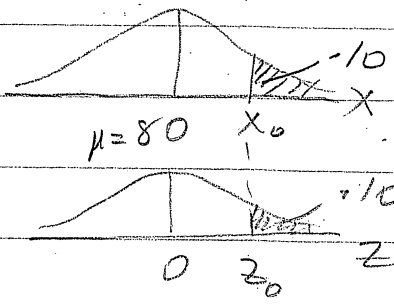
d. $P(X > X_0) = .10$

$P(Z > Z_0) = .10$

$P(Z < Z_0) = .90$

$Z_0 = 1.28$

$X_0 = (1.28)10 + 80 = 92.80$



e. $P(X_1 < X < X_2) = .08$

$P(X < X_1) = .46$

$P(Z < Z_1) = .46$

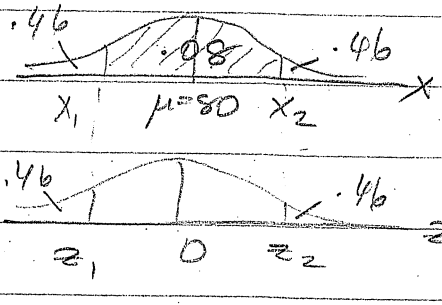
$Z_1 = -.10$

$X_1 = (-.10)10 + 80 = 79$

$P(Z < Z_2) = .54$

$Z_2 = .10$

$X_2 = (.10)(10) + 80 = 81$

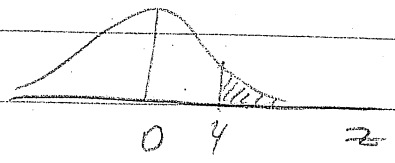


(6.21) $\mu = .2 \quad \sigma^2 = .0025$

$\sigma = .05$

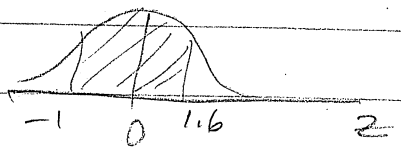
a. $P(X > .4) = P\left(z > \frac{.4 - .2}{.05}\right)$

$= P(z > 4) = 0$



b. $P(.15 < X < .28)$

$= P\left(\frac{.15 - .2}{.05} < z < \frac{.28 - .20}{.05}\right)$



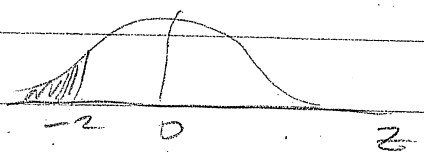
$= P(-1 < z < 1.6) = P(z < 1.6) - P(z < -1)$

$= .9452 - .1587 = .7865$

c. $P(X < .10) = P\left(z < \frac{.10 - .20}{.05}\right)$

$= P(z < -2)$

$= .0228$



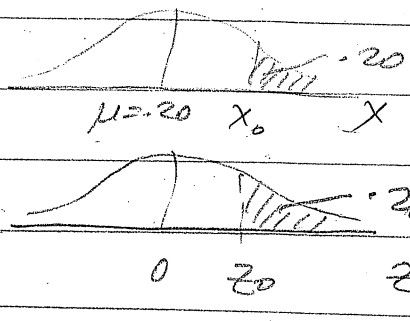
d. $P(X > X_0) = .20$

$P(z > z_0) = .20$

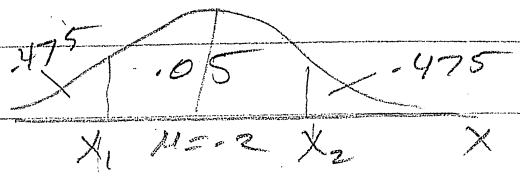
$P(z < z_0) = .80$

$z_0 = .84$

$X_0 = (.84)(.05) + .20 = .242$



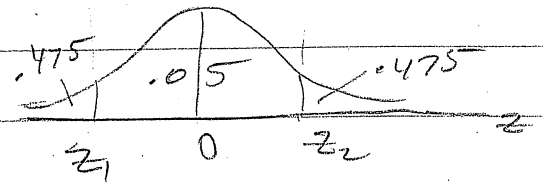
e. $P(X_1 < X < X_2) = .05$



$P(z_1 < z < z_2) = .05$

$P(z < z_1) = .475$

$z_1 = -.06$



$X_1 = (-.06)(.05) + .20 = .197$

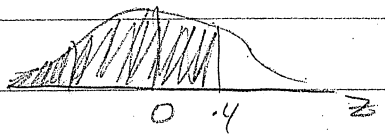
$P(z < z_2) = .525$

$z_2 = .06$

$X_2 = (.06)(.05) + .20 = .203$

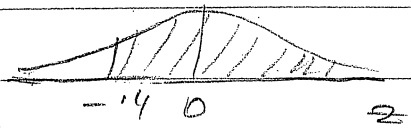
(6.22) $\mu = 380 \quad \sigma = 50$

a. $P(X < 400) = P\left(z < \frac{400-380}{50}\right)$



$= P(z < .4) = .6554$

b. $P(X > 360) = P\left(z > \frac{360-380}{50}\right)$



$= 1 - P(z > -.4) = 1 - .3446 = .6554$

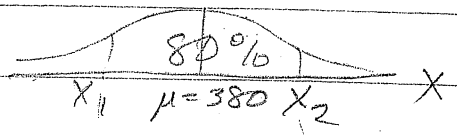
c. See pic's

d. $P(300 < X < 400) = P\left(\frac{300-380}{50} < z < \frac{400-380}{50}\right)$

$= P(-1.6 < z < .4) = P(z < -.4) - P(z < -1.6)$

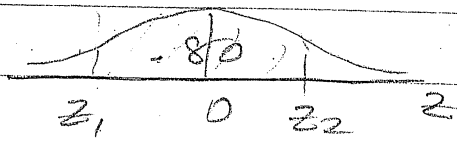
$= .6554 - .0548 = .6006$

e. $P(X_1 < X < X_2) = .80$



$= P(Z_1 < Z < Z_2) = .80$

$P(Z < Z_1) = .10$



$Z_1 = -1.28$

$X_1 = (-1.28)(50) + 380$

$= 316$

$P(Z < Z_2) = .90$

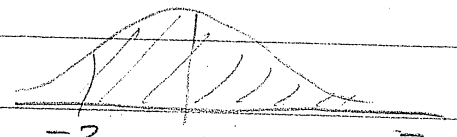
$Z_2 = 1.28$

$X_2 = (1.28)(50) + 380$

$= 444$

(6.23) $\mu = 1200 \quad \sigma = 100$

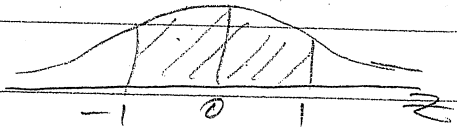
a. $P(X > 1000) = P\left(Z > \frac{1000 - 1200}{100}\right)$



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

$= .9772$

b. $P(1100 < X < 1300)$



$= P\left(\frac{1100 - 1200}{100} < Z < \frac{1300 - 1200}{100}\right)$

$= P(-1 < Z < 1) = P(Z < 1) - P(Z < -1) = .8413 - .1587$

$= .6826$

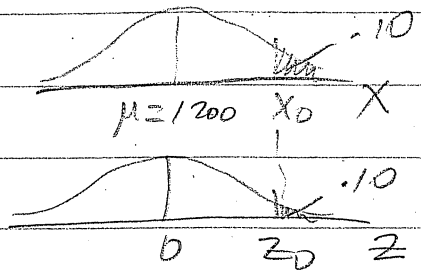
c. $P(X > X_0) = .10$

$P(z > z_0) = .10$

$P(z < z_0) = .90$

$z_0 = 1.28$

$X_0 = (1.28)(100) + 1200 = 1328$



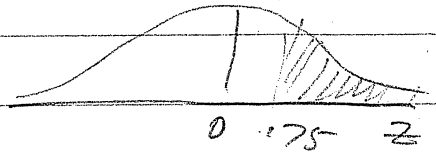
(6.24) $\mu = 35{,}000 \quad \sigma = 4000$

a. $P(X > 38{,}000)$

$= P\left(z > \frac{38{,}000 - 35{,}000}{4000}\right)$

$= P(z > .75) = 1 - P(z < .75)$

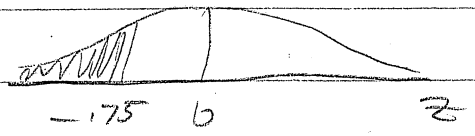
$= 1 - .7734 = .2266$



b. $P(X < 32000)$

$= P\left(z < \frac{32000 - 35000}{4000}\right)$

$= P(z < -.75) = .2266$



c. $P(32{,}000 < X < 38000)$

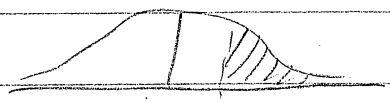
$= P\left(\frac{32000 - 35000}{4000} < Z < \frac{38000 - 35000}{4000}\right)$

$= P(-.75 < Z < .75)$

$= P(Z < .75) - P(Z < -.75) = .7734 - .2266 = .5468$

(6.25) $\mu = 12.2 \quad \sigma = 7.2$

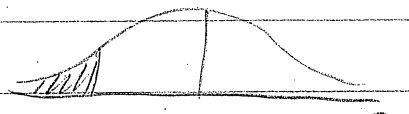
a. $P(X > 20) = P\left(Z > \frac{20 - 12.2}{7.2}\right)$



$= P\left(Z > \frac{7.8}{7.2}\right) = P(Z > 1.08)$

$= 1 - .8599 = .1401$

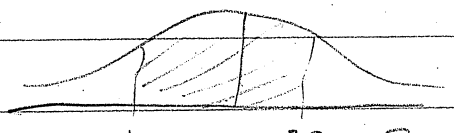
b. $P(X < 0) = P\left(Z < \frac{0 - 12.2}{7.2}\right)$



$= P(Z < -1.69) = .0455$

c. $P(5 < X < 15) = P\left(\frac{5 - 12.2}{7.2} < Z < \frac{15 - 12.2}{7.2}\right)$

$= P(-1 < Z < .39)$



$= P(Z < .39) - P(Z < -1)$

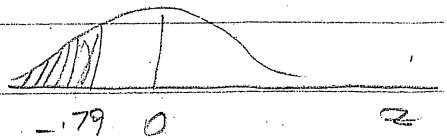
$= .6517 - .1587$

$= .493$

6.126 $\mu = 12.2 \quad \sigma = 2.8$

a. $P(X < 10) = P\left(Z < \frac{10 - 12.2}{2.8}\right)$

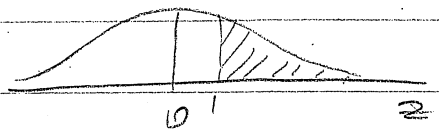
$= P(Z < -.79) = .2148$



b. $P(X > 15) = P\left(Z > \frac{15 - 12.2}{2.8}\right)$

$= P(Z > 1)$

$= 1 - P(Z < 1) = 1 - .8413 = .1587$

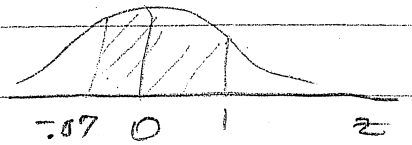


c. $P(12 < X < 15) = P\left(\frac{12 - 12.2}{2.8} < Z < \frac{15 - 12.2}{2.8}\right)$

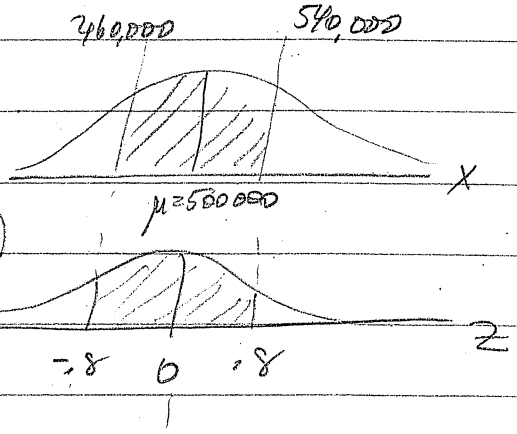
$= P(-.07 < Z < 1)$

$= P(Z < 1) - P(Z < -.07)$

$= .8413 - .4721 = .3692$



(6.27) $\mu = 500{,}000 \quad \sigma = 50{,}000$



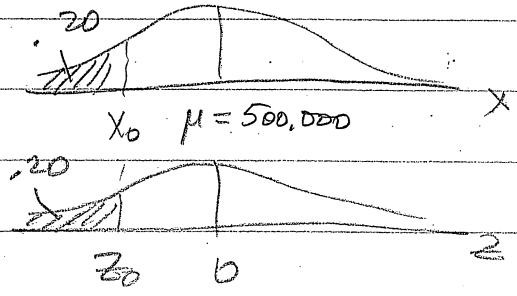
a. $P(460{,}000 < X < 540{,}000)$

$= P\left(\frac{460{,}000 - 500{,}000}{50{,}000} < Z < \frac{540{,}000 - 500{,}000}{50{,}000}\right)$

$= P(-.8 < Z < .8)$

$= P(Z < .8) - P(Z < -.8)$

$= .7881 - .2119 = .5762$



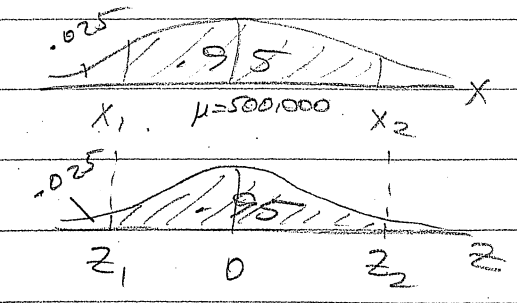
b. $P(X < X_0) = .20$

$P(Z < Z_0) = .20$

$Z_0 = -.84$

$X_0 = (-.84)(50{,}000) + 500{,}000$

$= 458{,}000$



c. $P(X_1 < X < X_2) = .95$

$P(X < X_1) = .025$

$P(Z < Z_1) = .025$

$Z_1 = -1.96$

$X_1 = (-1.96)(50{,}000) + 500{,}000$

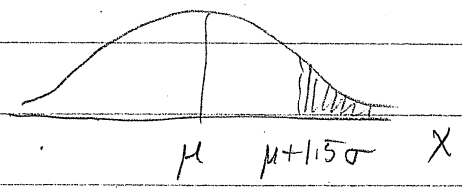
$= 402{,}000$

$P(Z < z_2) = .975$

$z_2 = 1.96$

$X_2 = (1.96)(50{,}000) + 500000 = 598{,}000$

6.28



$X = \mu + 1.5\sigma$

$Z = \frac{\mu + 1.5\sigma - \mu}{\sigma} = 1.5$

$P(Z > 1.5) = 1 - P(Z < 1.5)$

$= 1 - .9332$

$= .0668$

6.29

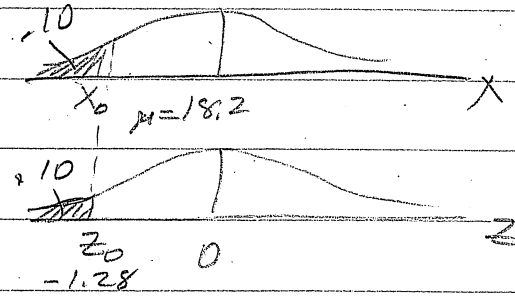
$\mu = 18.2 \quad \sigma = 1.6$

$P(X < X_0) = .10$

$P(Z < Z_0) = .10$

$Z_0 = -1.28$

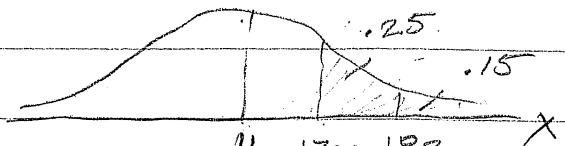
$X_0 = (-1.28)(1.6) + 18.2 = 16.15$

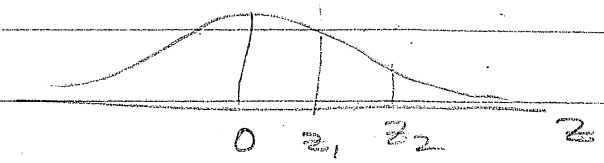


(6.30) $P(X > 17.8) = .25$

$P(X > 19.2) = .15$

$\mu = ?$ $\sigma = ?$





$P(z < z_1) = .25$

$z_1 = \frac{17.8 - \mu}{\sigma} = -.67 \Rightarrow 17.8 = -.67\sigma + \mu$ (1)

$P(z < z_2) = .85$

$z_2 = \frac{19.2 - \mu}{\sigma} = 1.04 \Rightarrow 19.2 = 1.04\sigma + \mu$ (2)

Solve simultaneously equations (1) & (2) for μ & σ.

From (1) $\mu = 17.8 - .67\sigma$

Sub. into (2) $19.2 = 1.04\sigma + 17.8 - .67\sigma$

$19.2 - 17.8 = .37\sigma$

$1.4 = .37\sigma$

$\frac{1.4}{.37} = \sigma$

$\sigma = 3.78$ $\boxed{\sigma^2 = 14.32}$

Then $\mu = 17.8 - .67(\sigma) = 17.8 - .67(3.78)$

$\mu = 17.8 - 2.53$

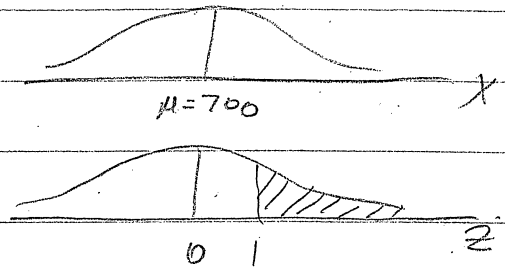
$\boxed{\mu = 15.26}$

(6.31) $\mu = 700 \quad \sigma = 120$

a. $P(X > 820) = P\left(z > \frac{820-700}{120}\right)$

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

$= 1 - .8413 = .1587$



b. $P(730 < X < 820)$

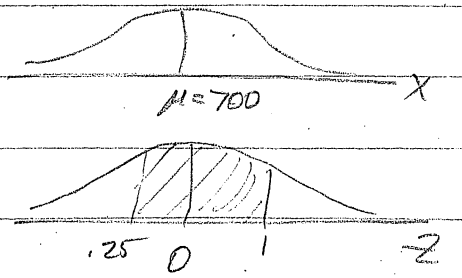
$= P\left(\frac{730-700}{120} < z < \frac{820-700}{120}\right)$

$= P(.25 < z < 1)$

$= P(z < 1) - P(z < .25)$

$= .8413 - .5987 = .2426$ prob. any one student gets a B.

$E(X) = n\,P(x) = 100(.2426) = 24.26$ average number of B's in 100 students.



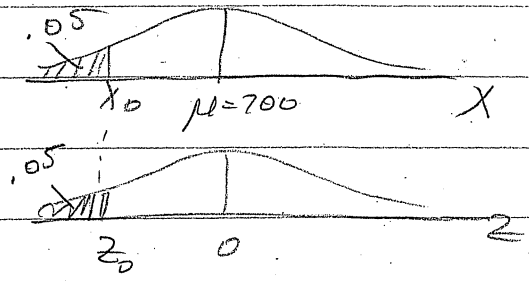
c. $P(x < X_0) = .05$

$P(z < z_0) = .05$

$z_0 = -1.645$

$X_0 = (-1.645)(120) + 700$

$= 502.6$



(6.32) A: $P(X \geq .10) = P\left(Z > \frac{.10 - .104}{.012}\right) = P(Z > -.33)$

$= 1 - P(Z < -.33)$

$= 1 - .3707 = .6293$

B: $P(X > .10) = P\left(Z > \frac{.10 - .11}{.04}\right) = P(Z > -.25)$

$= 1 - P(Z < -.25)$

$= 1 - .4013 = .5987$

Investment A has higher likelihood of earning at least 10%.

(6.33) A: $P(X < .05) = P\left(Z < \frac{.05 - .044}{.004}\right) = P(Z < 1.5)$

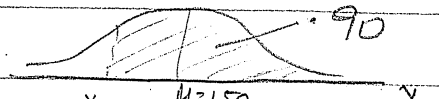
$= .9332$

B: $P(X < .05) = P\left(Z < \frac{.05 - .042}{.006}\right) = P(Z < 1.33)$

$= .9082$

Supplier A has more likelihood of less than 5% impurity.

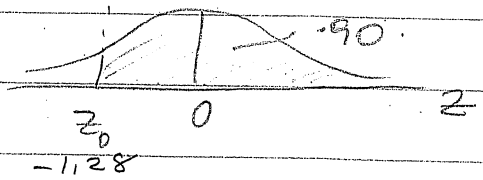
6.34 $\mu = 150 \quad \sigma = 40$



a. $P(X > X_0) = .90$

$P(Z > Z_0) = .90$

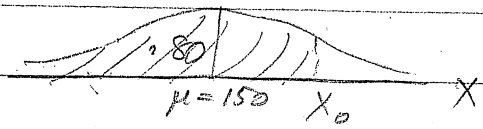
$P(Z < Z_0) = .10$



$Z_0 = -1.28$

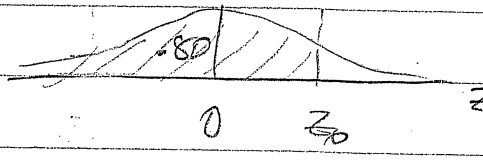
$X_0 = (-1.28)(40) + 150 = 98.80$

b. $P(X < X_0) = .80$



$P(Z < Z_0) = .80$

$Z_0 = .84$

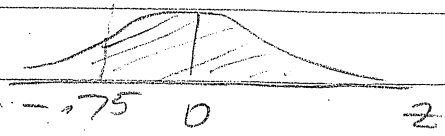


$X_0 = (.84)(40) + 150 = 183.6$

c. $P(X > 120) = P\left(Z > \frac{120 - 150}{40}\right)$

$= P(Z > -.75)$

$= P(Z < .75) = .7734$



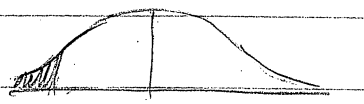
$P(\text{at least one student}) = P(\text{only one student}) - P(\text{both students})$

$= 2(.7734) - (.7734)^2$

$= 1.5468 - .5981$

$= .9487$

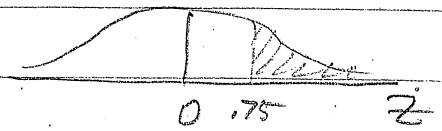
(6.35) $\mu = 75 \quad \sigma = 20$



a. $P(X < 60) = P\left(z < \frac{60-75}{20}\right)$

$= P(z < -.75) = .2266$

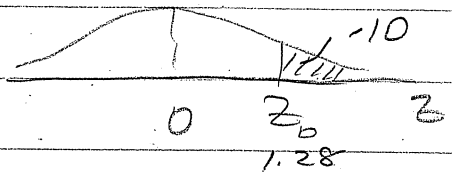
b. $P(X > 90) = P\left(z > \frac{90-75}{20}\right)$



$= P(z > .75)$

$= 1 - P(z < .75) = 1 - .7734 = .2266$

d. $P(X > X_0) = .10$

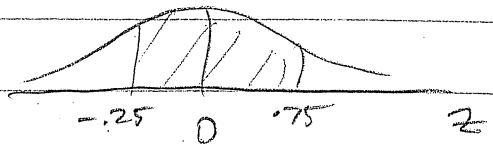


$P(z > z_0) = .10$

$z_0 = 1.28$

$X_0 = (1.28)(20) + 75 = 25.6 + 75 = 100.60$

(6.36) $\mu = 420 \quad \sigma = 80$



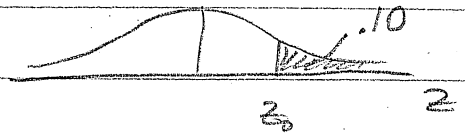
a. $P(400 < X < 480)$

$= P\left(\frac{400-420}{80} < Z < \frac{480-420}{80}\right)$

$= P(-.25 < Z < .75) = P(Z < .75) - P(Z < -.25)$

$= .7734 - .4013 = .3721$

b. $P(X > X_0) = .10$



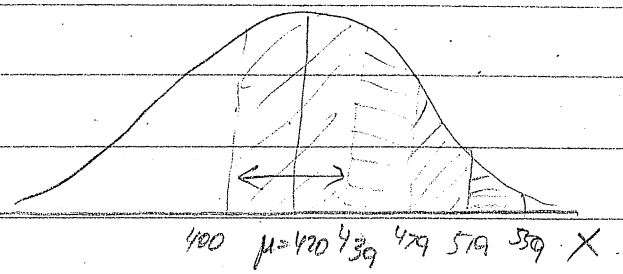
$P(Z > Z_0) = .10$

$P(Z < Z_0) = .90$

$Z_0 = 1.28$

$X_0 = (1.28)(80) + 420 = 102.4 + 420 = 522.4$

c.

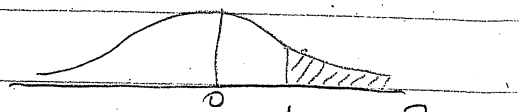


400 — 439 has highest probability of an individual being in this range because this range has largest area under the curve.

d. 520 - 559 is the least likely range.

e. $P(X>500) = P\left(z > \frac{500-420}{80}\right)$

$= P(z>1) = 1 - P(z<1) = 1 - .8413 = .1587$



probability of any one person's score exceeding 500.

$P(\text{at least one of two}) = P(\text{one}) + P(\text{the other one}) - P(\text{both})$

$= .1587 + .1587 - (.1587)^2$

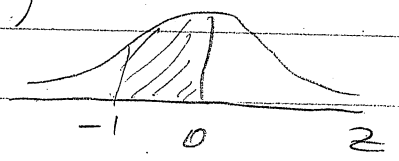
$= .2922$

6.37 $\mu = 200 \quad \sigma = 20$

a. $P(180<X<200) = P\left(\frac{180-200}{20} < z < \frac{200-200}{20}\right)$

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

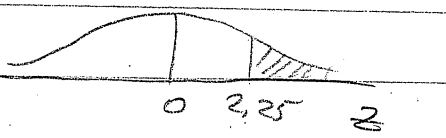
$= .50 - .1587 = .3413$

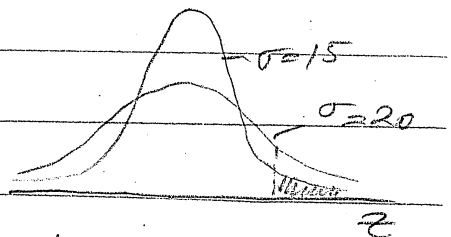


b. $P(X>245) = P\left(z > \frac{245-200}{20}\right)$

$= P(z>2.25) = 1 - P(z<2.25)$

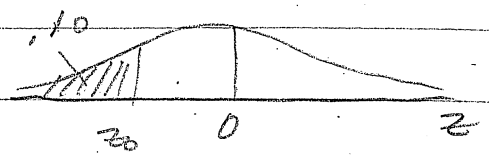
$= 1 - .9878 = .0122$





c. As σ gets smaller, less of the area (probability) will be under the curve for $z>2.25$

d. $P(X < X_0) = .10$

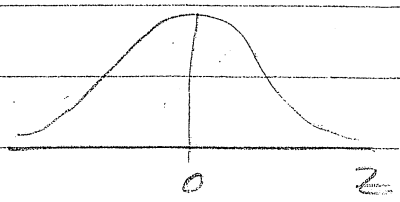


$P(Z < z_0) = .10$

$z_0 = -1.28$

$X_0 = (-1.28)(20) + 200 = 174.40$

(6.38) $\mu = 70$ $\quad P(X < 85) = .9332$



$P\left(Z < \frac{85-70}{\sigma}\right) = .9332$

$z = 1.5 = \frac{85-70}{\sigma}$

$\sigma = \frac{15}{1.5} = 10$

$P(X > 80) = P\left(Z > \frac{80-70}{10}\right) = P(z > 1) = 1 - P(z < 1)$

$= 1 - .8413 = .1587$ prob. of any one student scoring more than 80.

$P(\text{at least one of four}) = P(\text{one of four}) + P(2 \text{ of } 4) + P(3 \text{ of } 4) + P(4 \text{ of } 4)$

$= 1 - P(\text{zero of } 4) = 1 - (1 - .1587)^4$

$= 1 - .5010 = .4990$

6.59 $\mu_x = 100$ $\sigma_x^2 = 100$ $\mu_y = 200$ $\sigma_y^2 = 400$ $\rho_{xy} = .50$

$W = 5X + 4Y$

$E(W) = 5\mu_x + 4\mu_y = 5(100) + 4(200) = 1300$

$V(W) = (25)\sigma_x^2 + 16\sigma_y^2 + 2(5)(4)\,cov_{xy}$

where $\rho_{xy} = \dfrac{cov\,x,y}{\sigma_x \sigma_y}$

$.50 = \dfrac{cov\,xy}{\sqrt{100}\sqrt{400}}$

$cov\,xy = (.50)(10)(20)$

$= 100$

$V(W) = (25)(100) + (16)(400) + 40(100) = 12,900$

(6.60) $\mu_x = 100$ $\sigma_x^2 = 100$ $\mu_y = 200$ $\sigma_y^2 = 400$ $\rho_{xy} = -.50$

$W = 5X + 4Y$

$E(W) = 5\mu_x + 4\mu_y = 5(100) + 4(200) = 1300$

$V(W) = (25)\sigma_x^2 + (16)\sigma_y^2 + 2(5)(4)\,cov_{xy}$

where $\rho_{xy} = \dfrac{cov\,xy}{\sigma_x \sigma_y} = \dfrac{cov\,xy}{\sqrt{100} \cdot \sqrt{400}}$

$-.50 = \dfrac{cov\,xy}{200}$

$cov\,X,Y = (-.50)(200)$

$= -100$

$V(W) = 25(100) + (16)(400) + 40(-100)$

$= 2500 + 6400 - 4000$

$= 8900 - 4000 = 4900$

6.61 $\mu_X = 100$ $\mu_Y = 200$ $\rho_{XY} = .5$

$\sigma_X^2 = 100$ $\sigma_Y^2 = 400$

$W = 5X - 4Y$

$E(W) = 5(\mu_X) - 4(\mu_Y) = 5(100) - 4.(200)$

$= 500 - 800 = -300$

$V(W) = (25)\sigma_X^2 + 16(\sigma_Y^2) - 2(5)(4)\,cov\,X,Y$

where $\rho_{XY} = \frac{cov\,X,Y}{\sigma_X \cdot \sigma_Y} = \frac{cov\,X,Y}{\sqrt{100}\ \sqrt{400}}$

$.5 = \frac{cov_{X,Y}}{200}$

$cov\,X,Y = 100$

$V(W) = (25)(100) + (16)(400) - 40(100)$

$= 2500 + 6400 - 4000 = 4900$

(6.62) $\mu_x = 500 \quad \sigma_x^2 = 100 \quad \rho_{xy} = .50$

$\mu_y = 200 \quad \sigma_y^2 = 400$

$W = 5X - 4Y$

$E(W) = 5\mu_x - 4\mu_y = 5(500) - 4(200) = 2500 - 800 = 1700$

$V(W) = (25)\sigma_x^2 + (16)\sigma_y^2 - 2(5)(4)\,cov_{xy}$

where $\rho_{xy} = \dfrac{cov\,xy}{\sigma_x \cdot \sigma_y} = \dfrac{cov\,xy}{\sqrt{100}\sqrt{400}}$

$.5 = \dfrac{cov\,xy}{(10)(20)} = \dfrac{cov\,xy}{200}$

$cov\,xy = (.5)(200) = 100$

$V(W) = (25)(100) + (16)(400) - 40(100)$

$= 2500 + 6400 - 4000$

$= 4900$

6.63 $\mu_X = 100 \quad \sigma_X^2 = 500 \quad \rho_{XY} = -.5$

$\mu_Y = 200 \quad \sigma_Y^2 = 400$

$W = 5X - 4Y$

$E(W) = 5\mu_X - 4\mu_Y = 5(100) - 4(200) = 500 - 800 = -300$

$V(W) = (25)\sigma_X^2 + (16)\sigma_Y^2 - 2(5)(4)\,\text{cov}\,XY$

where $\rho_{XY} = \dfrac{\text{cov}\,XY}{\sigma_X \cdot \sigma_Y} = \dfrac{\text{cov}\,X,Y}{\sqrt{500}\,\sqrt{400}}$

$-.5 = \dfrac{\text{cov}\,XY}{(22.36)(20)} = \dfrac{\text{cov}\,XY}{447.21}$

$\text{cov}\,XY = (-.5)(447.21)$

$= -223.61$

$V(W) = (25)(500) + (16)(400) - 40(223.61)$

$= 12500 + 6400 - 8944.4 = 9955.6$

(6.64) $\Pi = 10{,}000 + 100{,}000 X \quad X \sim N(\underset{\mu}{.18}, \underset{\sigma}{.06})$

$E(\Pi) = 10{,}000 + 100000\, E(X) = 10{,}000 + 18000 = 28{,}000$

$V(\Pi) = 0 + (100{,}000)^2 V(X) \qquad V(X) = \sigma^2 = .0036$

$= 0 + 10000000000\ (.0036)$

$= 36{,}000{,}000$

$s(\Pi) = \sqrt{36{,}000{,}000} = 6000$