

2.1

$$c = 299,792,458 \text{ m/s} \quad (\text{p. 27})$$

a)

$$c = 299,792,458 \frac{\text{m}}{\text{s}} \times \frac{1 \text{ km}}{1000 \text{ m}} \times \frac{1 \text{ mile}}{1.609344 \text{ km}} \times \frac{3600 \text{ s}}{\text{hr}}$$

$$c = \underline{670,616,630 \text{ mile/hr}}$$

b)

$$c = 299,792,458 \frac{\text{m}}{\text{s}} \times \frac{1 \text{ ft}}{.3048 \text{ m}}$$

$$c = \underline{983,571,100 \text{ ft/s}}$$

2.2

a) $^{\circ}\text{K} = ^{\circ}\text{C} + 273.15^{\circ}$

$$^{\circ}\text{C} = 100^{\circ}\text{C}'$$

$$^{\circ}\text{K} = 100^{\circ} + 273.15^{\circ} = \underline{373.15^{\circ}\text{K}}$$

b)

$$^{\circ}\text{C} = \frac{5}{9} (^{\circ}\text{F} - 32^{\circ})$$

$$100^{\circ}\text{F} = 37.78^{\circ}\text{C}$$

$$\begin{aligned} ^{\circ}\text{K} &= ^{\circ}\text{C} + 273.15^{\circ} = 37.78^{\circ} + 273.15^{\circ} \\ &= \underline{310.93^{\circ}\text{K}} \end{aligned}$$

2.2 (cont)

c)

$$^{\circ}R = ^{\circ}F + 459.67^{\circ}$$

$$^{\circ}K = ^{\circ}C + 273.15^{\circ}$$

$$^{\circ}C = 5/9(^{\circ}F - 32)$$

$$\begin{aligned}^{\circ}K &= 5/9 [595^{\circ} - 491.67] + 273.15^{\circ} \\ &= \underline{330.55^{\circ}K} \quad \text{for } 595^{\circ}R\end{aligned}$$

2.3

a) From Fig 2.1

$$\begin{aligned}T_{lin} &= 231.928^{\circ}C = 449.47^{\circ}F \\ &= \underline{909.14^{\circ}R}\end{aligned}$$

b)

$$\begin{aligned}T_{al} &= 660.323^{\circ}C = 1,220.581^{\circ}F \\ &= \underline{1,680.251^{\circ}R}\end{aligned}$$

c)

$$\begin{aligned}T_{cu} &= 1084.62^{\circ}C = 1,984.316^{\circ}F \\ &= \underline{2,443.986^{\circ}R}\end{aligned}$$

2.4

$$F = ma = \frac{0.516f}{32.17 \text{ ft/sec}^2} \times \frac{5 \text{ ft}}{\text{sec}^2} = \underline{0.077716f}$$

2.5

$$m = 200 \text{ gm} \times \frac{1 \text{ kg}}{1000 \text{ gm}} = .2 \text{ kg}$$

$$a = 25 \frac{\text{cm}}{\text{sec}^2} \times \frac{1 \text{ m}}{100 \text{ cm}} = .25 \frac{\text{m}}{\text{s}^2}$$

$$F = ma = .2 \text{ kg} \times .25 \frac{\text{m}}{\text{s}^2} = .05 \frac{\text{kg} \cdot \text{m}}{\text{s}^2} = .05 \text{ N}$$

$$F = .05 \text{ N} \times \frac{1 \text{ lbf}}{4.448 \text{ N}} = \underline{0.01124 \text{ lbf}}$$

2.7

See Appendix A

a)

$$\underline{\frac{1 \text{ lbf}}{\text{in}^2} \times 6,894.38 = \frac{\text{N}}{\text{m}^2} = \text{Pa}}$$

2.8

$$1 \frac{\text{cm}^3}{\text{s}} = 1 \frac{\text{cm}^3}{\text{s}} \times \left(\frac{1 \text{ m}}{100 \text{ cm}} \right)^3 \times \left(\frac{1 \text{ gal}}{3.785412 \times 10^{-3} \text{ m}^3} \right) \times \frac{60 \text{ s}}{\text{min}}$$

$$= \underline{1.585032 \times 10^{-2} \frac{\text{gal}}{\text{min}}}$$

or

$$\underline{1 \frac{\text{gal}}{\text{min}} = 63.0902 \frac{\text{cm}^3}{\text{s}}}$$

2.9

$$R = \frac{1545 \text{ ft} \cdot \text{lb}_f}{\text{lbm mole} \cdot ^\circ\text{R}}$$

$$R = \frac{1545 \text{ ft} \cdot \text{lb}_f}{\text{lbm mole} \cdot ^\circ\text{R}} \times \frac{9.8066 \text{ lbm/ft} \cdot \text{s}^2}{\text{kg} \cdot \text{N}} \times \frac{3048 \text{ m}}{\text{ft}} \cdot \frac{^\circ\text{K}}{^\circ\text{R}}$$

$$\approx \underline{\underline{8313 \frac{\text{N} \cdot \text{m}}{\text{kg} \cdot \text{mole} \cdot ^\circ\text{K}}}}$$

3.1

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

$$@ p = 0.3 \quad z \approx .842 \quad \text{Table 3.2}$$

$$z = \frac{x - \mu}{\sigma} \rightarrow x = \mu \pm z\sigma$$
$$= 200 \pm 20 \times .842$$

$$\underline{x = 183.2 \rightarrow 216.8}$$

3.2 $\mu = 303 \quad \sigma = 33 \quad x > 350$

Eqn 3.10

$$z = \frac{x - \mu}{\sigma} = \frac{350 - 303}{33} = 1.42 \rightarrow p = .4222$$

Prob = .5 + .4222 or .9222 that $x < 350$

\therefore 7.8% chance any $x > 350$

3.3

a)

$$R_1 = [68 \pm 6.8] \times 10^{-3}$$

$$R_2 = [12 \pm 1.2] \times 10^{-3}$$

$$R = \frac{R_1 R_2}{R_1 + R_2} = \frac{12 \times 68}{68 + 12} \times 10^{-3} = \underline{10.2 \text{ k}\Omega}$$

3.3 (cont)

$$u_R = \left[\left(\frac{\partial R}{\partial R_1} u_{R_1} \right)^2 + \left(\frac{\partial R}{\partial R_2} u_{R_2} \right)^2 \right]^{1/2}$$

$$\frac{\partial R}{\partial R_1} = \frac{R_2}{(R_1 + R_2)^2} \quad \frac{\partial R}{\partial R_2} = \frac{R_1}{(R_1 + R_2)^2}$$

$$\frac{\partial R}{\partial R_1} = .0225 \quad \frac{\partial R}{\partial R_2} = .7225$$

$$\underline{u_R \approx \pm .88 \text{ k}\Omega}$$

3.4

$$R = R_1 + R_2 + R_3 + R_4 + R_5 = \underline{500 \Omega}$$

$$\frac{\partial R}{\partial R_n} = 1 \quad n=1, 2, 3, 4, 5$$

$$u_R = \left[\sum_{n=1}^5 \left(\frac{\partial R}{\partial R_n} u_{R_n} \right)^2 \right]^{1/2} = \sqrt{5(5)^2}$$

$$\underline{u_R = \pm 11.2 \Omega} \quad 500 \Omega \pm 11.2 \Omega$$

3.5

$$R_n = 1000 \Omega \quad \sqrt{R_n} = 50 \quad n=1, 2, 3$$

$$R = \frac{R_1 R_2 R_3}{R_1 R_2 + R_1 R_3 + R_2 R_3} \rightarrow R = 333 \Omega$$

$$\frac{\partial R}{\partial R_n} = \frac{1}{9} \quad n=1, 2, 3$$

3.5 (cont)

$$u_R = \sqrt{\sum_{n=1}^3 \left(\frac{\partial R}{\partial R_n} u_{R_n} \right)^2} = \sqrt{3 \left(\frac{1}{9} \times 50 \right)^2}$$

$$\underline{u_R = \pm 9.6 \Omega}$$

3.6

a) $R_1 = 47 \Omega$ $u_{R_1} = 0.47 \Omega$

$R_2 = 100 \Omega$ $u_{R_2} = 1 \Omega$

$R_3 = 180 \Omega$ $u_{R_3} = 1.8 \Omega$

$$R = R_1 + \frac{R_2 R_3}{R_2 + R_3} = 111.3 \Omega$$

$$\frac{\partial R}{\partial R_1} = 1.0 \quad \frac{\partial R}{\partial R_2} = 0.4133 \quad \frac{\partial R}{\partial R_3} = 0.1276$$

$$u_R = \left[(0.47)^2 + (0.4133)^2 + (0.1276 \cdot 1.8)^2 \right]^{1/2}$$

$$\underline{u_R = 0.67 \Omega}$$

$$R = 111.3 \Omega \pm 0.67 \Omega$$

b)

$u_{R_1} = 4.7$ $u_{R_2} = 1.0$ $u_{R_3} = 9$

$$u_R = \left[(4.7)^2 + (0.4133)^2 + (0.1276 \times 9)^2 \right]^{1/2}$$

$$\underline{u_R = \pm 4.86 \Omega}$$

3.7

$$\begin{aligned}
 \text{a)} \quad C_1 &= 0.05 \mu\text{F} & u_{C_1} &= 0.005 \mu\text{F} \\
 C_2 &= 0.1 \mu\text{F} & u_{C_2} &= 0.01 \mu\text{F} \\
 C &= C_1 + C_2 = 0.15 \mu\text{F}
 \end{aligned}$$

$$\frac{\partial C}{\partial C_1} = \frac{\partial C}{\partial C_2} = 1.0$$

$$u_C = \left[\sum_{n=1}^2 \left(\frac{\partial C}{\partial C_n} u_n \right)^2 \right]^{1/2}$$

$$u_C = \left[(0.005)^2 + (0.01)^2 \right]^{1/2} = \underline{\underline{\pm 0.011 \mu\text{F}}}$$

b)

$$C = \frac{C_1 C_2}{C_1 + C_2} = \frac{0.05 \times 0.1}{0.15} = \underline{\underline{0.033 \mu\text{F}}}$$

$$\frac{\partial C}{\partial C_1} = \frac{C_2^2}{(C_1 + C_2)^2} \quad \frac{\partial C}{\partial C_2} = \frac{C_1^2}{(C_1 + C_2)^2}$$

$$u_C = \left[(0.444 \times 0.005)^2 + (0.111 \times 0.01)^2 \right]^{1/2}$$

$$u_C = \underline{\underline{\pm 0.0025 \mu\text{F}}}$$

3.8

$$L_1 = 0.5 \text{ mH} \quad u_{L_1} = 0.1 \text{ mH}$$

$$L_2 = 1.0 \text{ mH} \quad u_{L_2} = 0.2 \text{ mH}$$

$$L = \frac{L_1 L_2}{L_1 + L_2} = \frac{0.5}{1.5} = \underline{\underline{0.333 \text{ mH}}}$$

3.8 (cont.)

$$\frac{\partial L}{\partial L_1} = .444$$

$$\frac{\partial L}{\partial L_2} = .111$$

$$u_L = \left[(.444 \times .1)^2 + (.111 \times .2)^2 \right]^{1/2}$$

$$\underline{u_L = \pm .0497 \text{ mH}}$$

3.9

$$P = I^2 R \quad \frac{u_I}{I} = .5\% \quad \frac{u_R}{R} = .1\%$$

$$\frac{u_P}{P} = \left[\left(2 \frac{u_I}{I} \right)^2 + \left(\frac{u_R}{R} \right)^2 \right]^{1/2} = \sqrt{(1.0)^2 + (.1)^2}$$

$$\frac{u_P}{P} = \underline{.54\%}$$

$$P = VI \quad \frac{u_I}{I} = .5\% \quad \frac{u_V}{V} = .5\%$$

$$\frac{u_P}{P} = \left[\left(\frac{u_I}{I} \right)^2 + \left(\frac{u_V}{V} \right)^2 \right]^{1/2} = \sqrt{2(.5)^2}$$

$$\frac{u_P}{P} = \underline{.71\%}$$

$P = I^2 R$ is most accurate here

3.10

\bar{X}	d 3.9942	l 4.5066
S_x	.0045	.0126

$$P_x = t_{\alpha/2} \sqrt{\frac{S_x}{n}}$$

$$n = 4$$
$$v = n - 1 = 3$$
$$\alpha/2 = \frac{1 - .95}{2} = .025$$

$$t_{.025, 3} = 3.182$$

$$P_d = 3.182 \frac{.0045}{2} = .0072$$

PRECISION ERROR

$$P_l = 3.182 \frac{.0126}{2} = .0260$$

$$\frac{P_d}{d} \times 100 = \frac{.0072}{3.9942} \times 100 = .18\%$$

$$\frac{P_l}{l} \times 100 = \frac{.026}{4.5066} \times 100 = .445\%$$

Bias Error

$$v = \frac{\pi d^2}{4} l; \quad u_d = .5\% = \frac{u_l}{l}$$

$$\frac{u_v}{v} = \sqrt{\left(2 \frac{u_d}{d}\right)^2 + \left(\frac{u_l}{l}\right)^2}$$

TOTAL ERROR

$$\frac{u_v}{v} = \left[\left(\frac{u_d}{d}\right)^2 + \left(\frac{u_l}{l}\right)^2 \right]^{1/2}$$

3.10 (Cont)

$$\frac{U_d}{d} = \left(\frac{P_d \times 100}{d} \right)^2 + \left(2 \frac{u_d}{d} \right)^2 = (.18)^2 + (2(.5))^2 = 1.032\%$$

$$\frac{U_l}{l} = \left(\frac{P_l \times 100}{l} \right)^2 + \left(\frac{u_l}{l} \right)^2 = (.445)^2 + (.5)^2 = 0.448\%$$

$$\frac{U_v}{V} = \sqrt{(1.48)} \approx \underline{\underline{1.22\%}}$$

3.11

$$V = \frac{\pi}{4} (d_o^2 - d_i^2) \times l$$

$$\frac{u_l}{l} = \frac{.5}{52} = .96\%$$

$$\frac{u_{d_o}}{d_o} = \frac{.04}{20} = .2\%$$

$$\frac{u_{d_i}}{d_i} = \frac{.08}{15} = .53\%$$

$$\frac{U_v}{V} = \left[\left(2 \frac{u_{d_o}}{d_o} \right)^2 + \left(2 \frac{u_{d_i}}{d_i} \right)^2 + \left(\frac{u_l}{l} \right)^2 \right]^{1/2}$$

$$\frac{U_v}{V} = \underline{\underline{1.49\%}}$$

3.12

$$\sigma = \frac{Mc}{I} \quad I/c = \frac{\pi d^3}{32}$$

$$\sigma = \frac{32FL}{\pi d^3}$$

3.12 (cont)

$$\frac{u_F}{F} = \frac{5}{350} = 1.43\% \quad \frac{u_L}{L} = \frac{1.5}{6.12} = 2.08\%$$

$$\frac{u_d}{d} = \frac{.08}{2.5} = 3.27\%$$

$$\begin{aligned} \frac{u_T}{T} &= \left[\left(\frac{u_F}{F} \right)^2 + \left(\frac{u_L}{L} \right)^2 + \left(3 \frac{u_d}{d} \right)^2 \right]^{1/2} \\ &= \left[(1.43)^2 + (2.08)^2 + (3 \times 3.27)^2 \right]^{1/2} \end{aligned}$$

$$\frac{u_T}{T} = \underline{\underline{+9.93\%}}$$

3.13

$$\frac{u_T}{T} = 6\%$$

$$\frac{u_T}{T} = \left[\left(\frac{u_F}{F} \right)^2 + \left(\frac{u_L}{L} \right)^2 + \left(3 \frac{u_d}{d} \right)^2 \right]^{1/2}$$

$$\left(\frac{u_d}{d} \right)^2 = \frac{1}{9} \left[6^2 - (1.43)^2 - (2.08)^2 \right]$$

$$\frac{u_d}{d} = \underline{\underline{+1.81\%}}$$

3.14

$$\bar{X}_A = 30 \quad S_A = 2 \quad n_A = 21$$

$$\bar{X}_B = 34 \quad S_B = 6 \quad n_B = 9$$

$$\alpha = 1 - .95 = .05$$

$$V = \frac{\left[\left(\frac{S_A^2}{n_A} \right) + \left(\frac{S_B^2}{n_B} \right) \right]^2}{\frac{\left(\frac{S_A^2}{n_A} \right)^2}{n_A - 1} + \frac{\left(\frac{S_B^2}{n_B} \right)^2}{n_B - 1}} = \frac{\left[\frac{2^2}{21} + \frac{6^2}{9} \right]^2}{\frac{(2^2/21)^2}{20} + \frac{(6^2/9)^2}{8}}$$

$$V = 8.77 = 8$$

$$t = \frac{\bar{X}_A - \bar{X}_B}{\sqrt{\frac{S_A^2}{n_A} + \frac{S_B^2}{n_B}}} = \frac{30 - 34}{\sqrt{\frac{2^2}{21} + \frac{6^2}{9}}}$$

$$t = -1.954$$

$$t_{\alpha/2, V} = t_{0.025, 8} = 2.306$$

Since $-t_{0.025, 8} \leq t \leq t_{0.025, 8}$ there is no significant difference at 95% confidence level

3.15

$$n=150 \quad \bar{x} = \mu = 10 \quad s_{\bar{x}} = \sigma = 3.4$$

$$\text{@ } x=15 \quad z = \frac{x-\mu}{\sigma} = \frac{15-10}{3.4} \approx 1.471$$

$$z = 1.471 \rightarrow P_z = 0.4293$$

$$150 \times 0.4293 = 64.4$$

Between 10 \rightarrow 15 64 marbles

3.16

$$\bar{D} = 10.25 \quad S_D = 0.25 \quad n = 10$$

$$\bar{t} = 0.25 \quad S_t = 0.05 \quad n = 10$$

$$P = 100 \pm 10 \text{ psi} \rightarrow \frac{U_P}{P} = 10\%$$

$$\text{For this case } \frac{B_D}{D} = \frac{B_t}{t} = \frac{P_D}{P} = 0$$

$$\sigma_{\theta} = \frac{PD}{2t} = \frac{100 \times 10.25}{2 \times 0.25} = \underline{20.5 \text{ Kpsi}}$$

Assume 95% Confidence
 $\alpha = 1 - 0.95 = .05$

$$t_{\alpha/2, v} = t_{.025, 9} = 2.262 \text{ (Table 3.6)}$$

$$P_x = t_{\alpha/2, v} \frac{S_x}{\sqrt{n}} \quad \text{Precision Error.}$$

$$\frac{P_D}{D} = \frac{2.262 \times 0.25}{10.25 \sqrt{10}} = 1.7\%$$

$$\frac{P_t}{t} = \frac{2.262 \times 0.05}{.25 \sqrt{10}} = 14.3\%$$

3.16 (cont)

$$\frac{U_{T_D}}{T_D} = \left[\left(\frac{U_P}{P} \right)^2 + \left(\frac{P_D}{D} \right)^2 + \left(\frac{P_t}{t} \right)^2 \right]^{1/2}$$
$$= \sqrt{10^2 + 1.7^2 + 14.3^2} = \underline{17.5\%}$$

3.17

$$P = I^2 R = 3.2^2 \times 1000 = 10.24 \text{ KW}$$

From Prob 3.9

$$\frac{U_P}{P} = \pm 0.54\% = \pm 0.0054$$

$$U_P = \pm 0.0054 \times 10.24 \text{ KW} = \pm \underline{.06 \text{ KW}}$$

3.18

$$n = 120 \quad \text{Assume } \bar{x} = \mu = 39$$
$$s_x = \sigma = 4.0$$

$$z_1 = \frac{35 - 39}{4} = -1 \quad P_1 = .3413 \quad \text{Table 3.2}$$

$$z_2 = \frac{45 - 39}{4} = 1.5 \quad P_2 = .4332$$

$$P = P_1 + P_2 = .7745$$

$$\text{Number } 35 \rightarrow 45 = 120 \times .7745 \times \underline{93}$$

3.19

prob 3.19	Data Set 1	Data Set 2
# Samples	6	6
Raw Data		
1	2.48	2.18
2	2.76	2.48
3	2.96	2.38
4	2.72	2
5	2.62	2.1
6	2.65	2.28
7		
8		
9		
10		
11		
12		
13		
14		
15		
Average	2.698333333	2.236666667
Standard Dev	0.16055113	0.17862437
Eq. 3.25a Num	9.2427E-05	
3.25a Denom	9.3471E-06	
Nu	9	
t	4.70846091	

From Spreadsheet

n	w	w/o	
\bar{x}	6	6	$v = 9$
s_x	2.70	2.24	$\alpha = 1 - .99 = .01$
	0.16	0.17	$t_{\alpha/2, v} = 3.250$

$v = 9$ Egn 3.25a
 $t = 4.708$ Egn 3.25

3.19 (Cont)

$$t > t_{.005, 9}$$

There is a significant difference

3.20

prob 3.20	Data Set 1	Data Set 2
# Samples	6	5
Raw Data		
1	93.52	92.38
2	92.81	93.21
3	94.32	92.55
4	93.77	92.05
5	93.57	92.54
6	93.12	
7		
8		
9		
10		
11		
12		
13		
14		
15		
Average	93.5183333	92.546
Standard Dev	0.52327494	0.42264642
Eq. 3.25a Num	0.00661979	
3.25a Denom	0.00073562	
Nu	8	
t	3.40882001	

From Spreadsheet See Next Page

3.20 (Cont)

	A	B	
n	6	5	
\bar{x}	93.5	92.5	
s_x	0.52	0.42	$\alpha = 1 - .99 = .01$

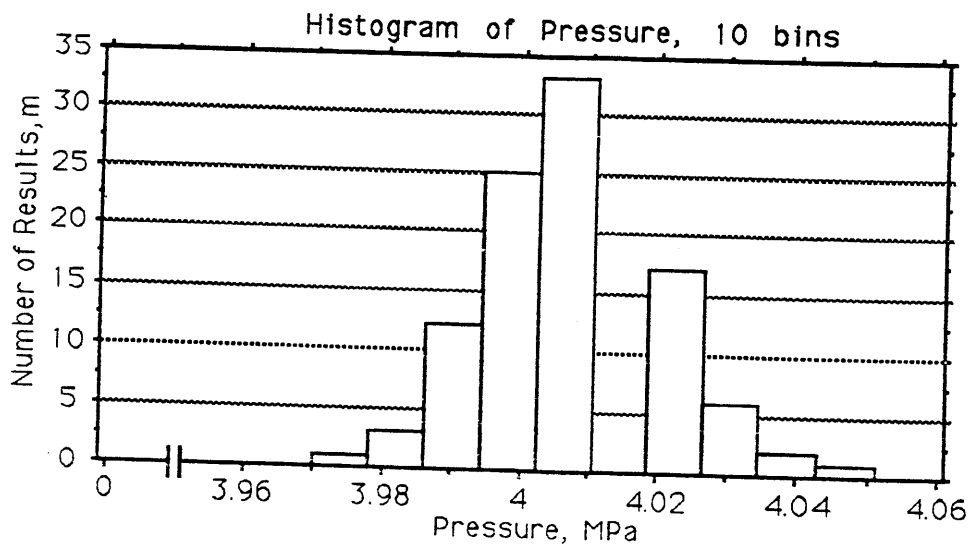
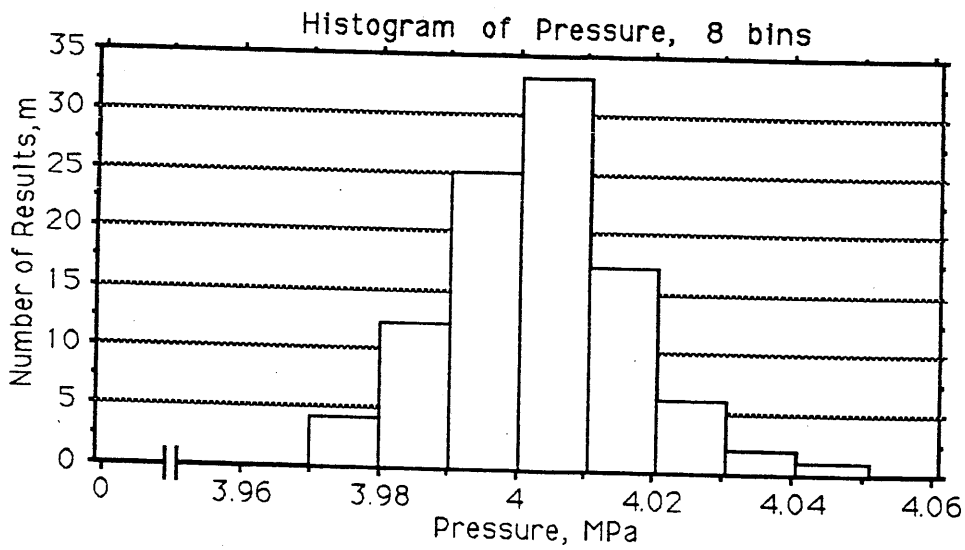
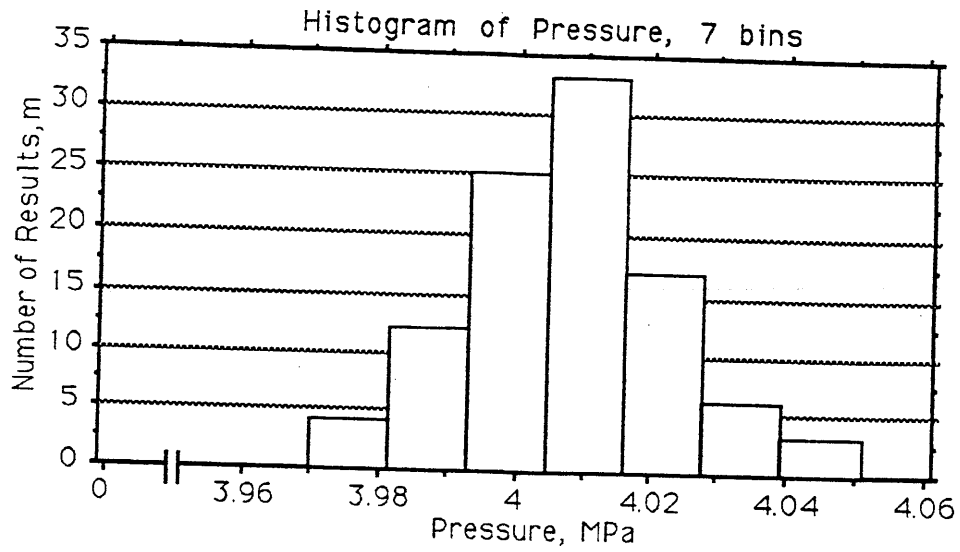
Eqn 3.25a $v = 8$

Eqn 3.25 $t = 3.409$

$t_{\alpha/2, v} = t_{.005, 8} = 3.355$ (Table 3.6)

Since $t > 3.355 \rightarrow$ Significant Difference.

3.21



3.22

$$n = 9 \quad v = n - 1 = 8 \quad \alpha = 1 - .95 = .05$$

$$\bar{X} = 68.06 \quad S_x = 0.846$$

$$t_{\alpha/2, v} = t_{.025, 8} = 2.306$$

$$\text{Range } \bar{X} \pm t_{\alpha/2, v} \frac{S_x}{\sqrt{n}} = 68.06 \pm 2.306 \frac{.846}{\sqrt{9}}$$

$$\underline{67.4 < \mu < 68.7}$$

3.23

$$\alpha = .10$$

$$n = 12$$

$$v = 11$$

$$\bar{X} = 1.257$$

$$S_x = 0.034$$

$$t_{\alpha/2, v} = t_{.05, 11} = 1.796$$

$$\text{Range } \bar{X} \pm t_{\alpha/2, v} \frac{S_x}{\sqrt{n}} = 1.257 \pm 1.796 \frac{.034}{\sqrt{11}}$$

$$\underline{1.239 < \mu < 1.275}$$

3.24

See Spreadsheet Next Page

	A	B	
$\frac{n}{X}$	10	10	$v = 17$
S_x	56.8	57.8	$t = -0.194$
	11.9	11.17	$\alpha = 1 - .99 = .01$

$$t_{\alpha/2, v} = t_{.005, 17} = 2.898 \quad \text{Table 3.6}$$

3.24 (Cont)

prob 3.24	Data Set 1	Data Set 2
# Samples	10	10
Raw Data		
1	72	73
2	43	45
3	54	56
4	75	75
5	50	53
6	48	50
7	73	72
8	55	54
9	48	48
10	50	52
11		
12		
13		
14		
15		
Average	56.8	57.8
Standard Dev	11.8958443	11.1733811
Eq. 3.25a Num	709.45282	
3.25a Denom	39.5683665	
Nu	17	
t	-0.1937622	

3.24 (Cont)

Since $|t| < 2.898 \rightarrow$ No Significant Difference

3.25

$$y = 1.0 - 0.2x + 0.01x^2 \quad (0 \leq x \leq 3)$$

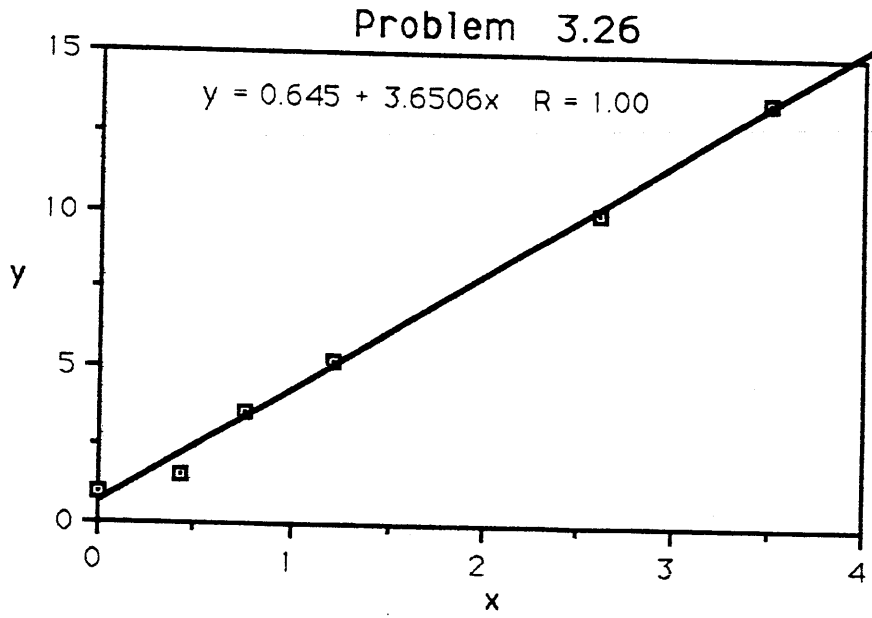
$$\frac{u_x}{x} = .02$$

$$u_y = \left| \frac{\partial y}{\partial x} u_x \right| = |(-.2 + 0.02x)(.02x)|$$

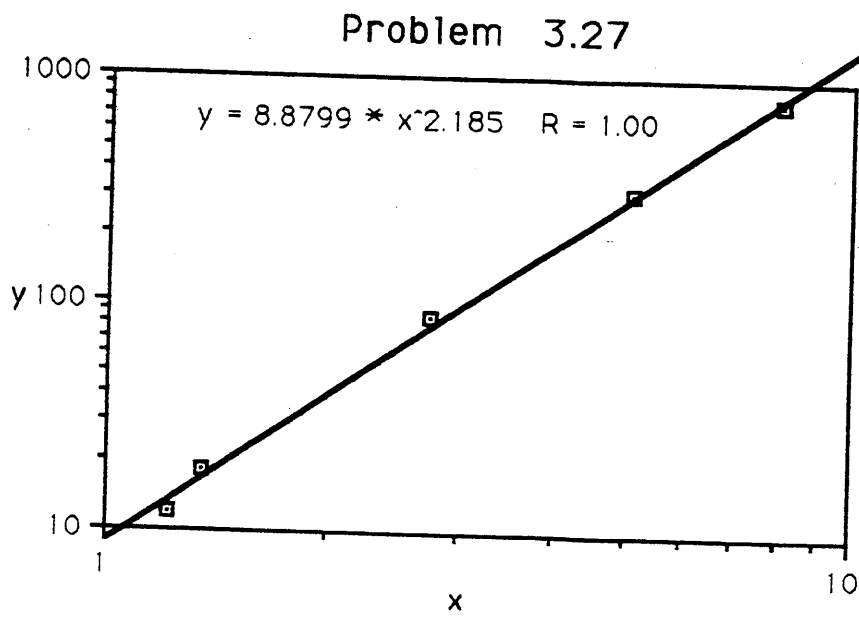
$$u_y = |-0.004x + 0.0004x^2|$$

$$\underline{u_{y \max} = u_y(x=3) = \pm 0.0084}$$

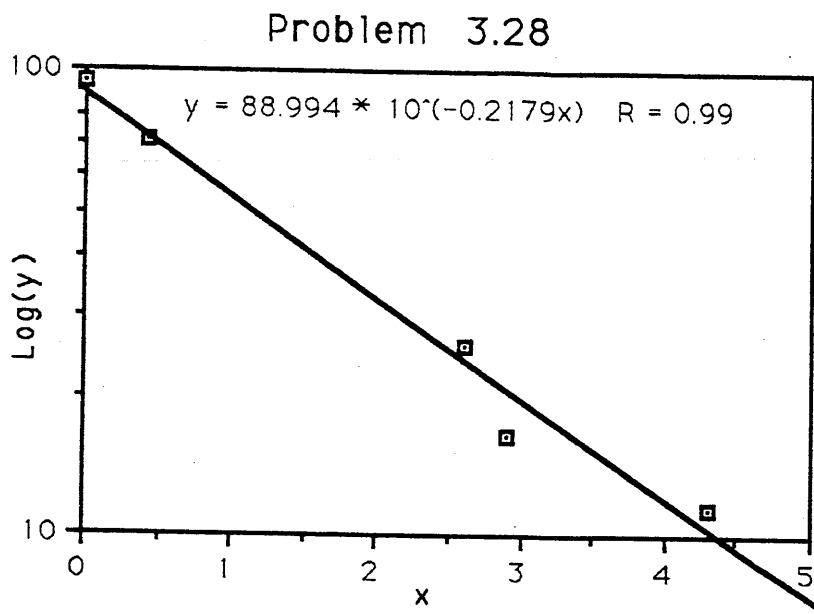
3.26



3.27



3.28



3.29

prob 3.29	Data Set 1	Data Set 2
# Samples	7	7
Raw Data		
1	3475	1813
2	4326	3145
3	2262	4140
4	7415	6867
5	3418	3842
6	4404	3984
7	3788	3053
8		
9		
10		
11		
12		
13		
14		
15		
Average	4155.42857	3834.85714
Standard Dev	1604.2936	1553.72707
Eq. 3.25a Num	5.0772E+11	
3.25a Denom	4.2354E+10	
Nu	11	
t	0.37976785	

	Small	Large	
n	7	9	
\bar{X}	4155	3835	$\alpha = 1 - .95 = .05$
S_x	1604	1554	

$v = 11$ Eqn 3.25a $t = 0.380$ Eqn 3.25

$$t_{(\alpha/2), v} = t_{.025, 11} = 2.201$$

$|t| < 2.201$ No Sig. Diff