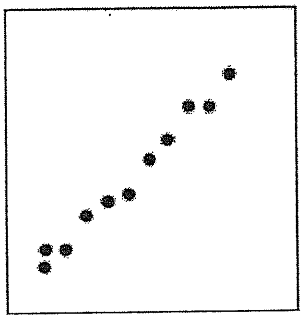
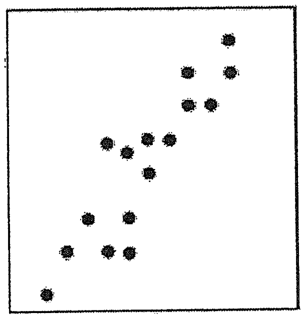
CHAPTER 2 REVIEW

STATION 1

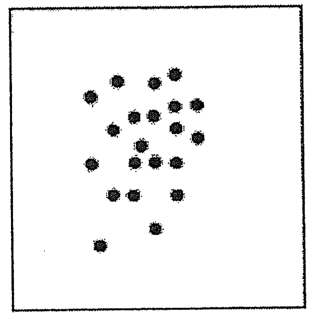
1) What type of correlation (**positive, negative, or no**) and (**strong, medium or weak**) do the following graphs show?



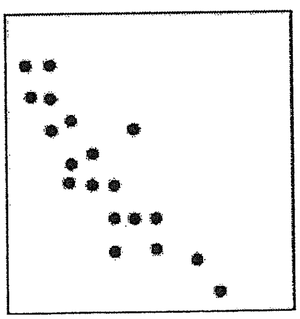
POSITIVE
STRONG



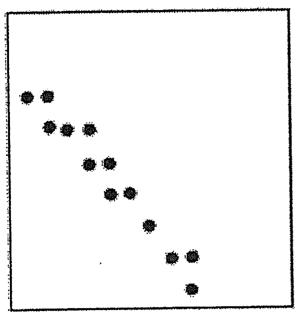
POSITIVE
MEDIUM



NO
WEAK



NEGATIVE
MEDIUM



NEGATIVE
STRONG

2) Evaluate $f(-2)$ *when* $f(x) = 6x^2 + 14x - 3$.

$f(-2) = 6(-2)^2 + 14(-2) - 3 \quad = \boxed{-7}$

3) Give an expression for $h(a+2)$ *if* $h(x) = 4x^2 + 7x + 3$.

$(a+2)(a+2)$

$a^2 + 4a + 4$

$h(a+2) = 4(a+2)^2 + 7(a+2) + 3$

$= 4(a^2 + 4a + 4) + 7a + 14 + 3$

$= 4a^2 + 16a + 16 + 7a + 14 + 3$

$= \boxed{4a^2 + 23a + 33}$

STATION 2

4) Find the exponential equation for the exponential curve that goes through the points (4,10) and (9, 258).

$x_1\ y_1 \quad x_2\ y_2$

$b^{9-4} = \frac{258}{10}$

$(b^5)^{1/5} = (25.8)^{1/5}$

$\boxed{b = 1.916}$

$y = a(1.916)^x$

$\frac{10}{1.916^4} = \frac{a\ (1.916)^4}{1.916^4}$

$a = 0.742$

$\boxed{y = 0.742(1.916)^x}$

For questions 5-6, answer these questions:

a) Does the function model exponential decay or exponential growth? **Explain.**

b) Identify the initial value.

5) $f(x) = 25(0.05)^x$

a) Decay

$0 < b < 1$

b) 25

6) $f(x) = 3.2(7)^x$

a) Growth

$b > 1$

b) 3.2

★ Don't Round for #8

STATION 3

7) A certain substance has a half-life of 12 years. If a sample of 70 grams is being observed, how much will remain in 30 years?

$(0.5)^{1/12} = (b^{12})^{1/12}$

$\boxed{b = 0.9439}$

$y = 70(0.9439)^{30}$

$\boxed{y = 12.38 \text{ grams}}$

8) The equation $P(x) = 9006(1.012)^x$ can be used to model Burlington Wisconsin's population x years after 1990. Burlington's population in 2003 was 10,379. Find the residual from this model, to the ~~nearest thousand~~.

$2003 - 1990$

13 years after 1990

$P(13) = 9006(1.012)^{13}$

$= 10516.68$ (Pred)

$R =$ Obs $-$ Pred

$= 10379 - 10516.68$

$\boxed{R = -137.68}$

STATION 4

In #9, use the table below. This table shows the average per-student cost for tuition and fees for an academic year at a two-year public college.

Year	Coded Year	Tuition and fees
2000	0	$1,338
2001	1	$1,333
2002	2	$1,380
2003	3	$1,483
2004	4	$1,702
2005	5	$1,847

(*The World Almanac and Book of Facts 2007*)

9. a) Calculate the number of years past 2000 and fill in the table under Coded Year.

b) Find an equation for the **line of best fit** for the data. Let x be the number of years past 200 and y be the tuition and fees.

$y = 107.286x + 1245.619$

c) Explain what the slope of the equation means in this context.

↑ of $107.286 tuition and fees per year

d) Identify the correlation coefficient and explain what it tells you about the relationship between the year and tuitions and fees?

$r = 0.938$

- Strong positive correlation
- As years ↑, so does tuition

e) Calculate the sum of squared residuals.

$\Sigma x^2 = 27,457.905$

STATION 5

For #10) use the table below. This table shows the average per-student cost for tuition and fees for an academic year at a two-year public college.

Year	Coded Year	Tuition and fees
2000	0	$1,338
2001	1	$1,333
2002	2	$1,380
2003	3	$1,483
2004	4	$1,702
2005	5	$1,847

(*The World Almanac and Book of Facts 2007*)

10. a) Find an **exponential equation** for the data above. Let x be the number of years past 2000 and y be the tuition and fees.

$y = 1263.698 (1.071)^x$

b) Use your equation from part 10a to estimate the educational expenditures in 2004.

$\to 4$

$y = 1263.698 (1.071)^4$

$\boxed{y = \$1662.65}$ (Pred)

c) What is the residual in Part 10b?

$R = \text{obs} - \text{pred}$

$= 1702 - 1662.65 = \boxed{\$39.35}$

d) Calculate the sum of squared residuals.

$\Sigma x^2 = 21288.7865$

e) What model better fits the data, linear or exponential? **Explain.**

Exp $\Rightarrow$ Smaller sum of squared residuals, so better fit.

STATION 6

11) Nora hits a soft ball straight up at a speed of 120 ft/sec. If her bat contacts the ball 3 feet above the ground.

V_o h_o

a) Write an equation for the height h (in feet above the ground) of the ball after t seconds.

Use the formula $h = -\frac{1}{2}gt^2 + v_0 t + h_0$, *where* $g = 32\,ft\,/\,\sec^2$

$$h = -\frac{1}{2}(32)t^2 + 120t + 3$$

$$\boxed{h = -16t^2 + 120t + 3}$$

b) Predict the height for the ball above the ground after 4 seconds.

$$h(4) = -16(4)^2 + 120(4) + 3$$

$$= \boxed{227\ ft}$$

c) At what time will the ball hit the ground floor? (Hint – Use the Quadratic Formula)

$$0 = -16t^2 + 120t + 3$$

$a = -16 \quad b = 120 \quad c = 3$

$$x = \frac{-(120) \pm \sqrt{(120)^2 - 4(-16)(3)}}{2(-16)}$$

$$x = \frac{-120 \pm \sqrt{14592}}{-32}$$

$$\frac{-120 + \sqrt{14592}}{-32} = -0.0\cancel{2}\ sec$$

$$\frac{-120 - \sqrt{14592}}{-32} = \boxed{7.52\ sec}$$

STATION 7

In 12-13, suppose that y = 20 when x = 5. For each situation:

a) Compute the constant of variation.

b) Find y when x = 2.

12) Y varies inversely as x.

a) $Y = \frac{K}{x}$

$5(20) = \left(\frac{K}{5}\right)5$

$\boxed{K = 100}$

b) $y = \frac{100}{x}$

$y = \frac{100}{2}$

$\boxed{y = 50}$

13) Y varies inversely as the cube of x.

a) $Y = \frac{K}{x^3}$

$5^3(20) = \left(\frac{K}{5^3}\right)5^3$

$\boxed{K = 2500}$

b) $Y = \frac{2500}{2^3}$

$\boxed{y = 312.5}$