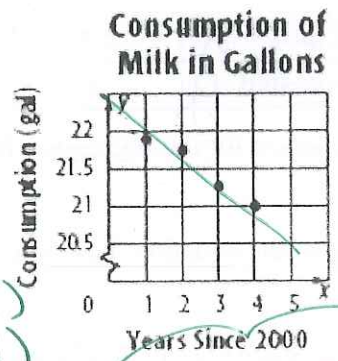
Key

# 4-5 through 4-7 Review

## 4-5 Scatterplots

1. Refer to the scatter plot of gallons of milk consumption per person for selected years.




a. Use the points (2, 21.75) and (4, 21) to write the slope-intercept form of an equation for the line of fit.

Step 1: $m = \frac{21.75-21}{2-4} = \frac{.75}{-2}$

$m = -0.375$

Step 2: $y - y_1 = m(x - x_1)$

$y - 21 = -0.375(x - 4)$

$y - 21 = -0.375x + 1.5$

$+21 \quad +21$

$y = -0.375x + 22.5$

b. Predict the milk consumption in 2025.

data started in 2000 so $x = 25$

$y = -0.375(25) + 22.5$

Approx. 13.125 gallons

c. Is it reasonable to use the equation to estimate the consumption of milk for any year? Explain.

no - because consumption would never be a negative value

## 4-6 Linear Regression

**Write the line of best fit using the stat function on your calculator (or Desmos). Identify the correlation coefficient and explain if the equation is a good model for the data.**

2.

| | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| Year | ~~2006~~ | 2007 | 2008 | 2009 | 2010 |
| Turtles Hatched | 21 | 17 | 16 | 16 | 14 |

years since 2006

$y = -1.5x + 19.8$

$r = -.916$

correlation coefficient is above .9

$|-.916| = .916$

3. **POPULATION** Detroit, Michigan, like a number of large cities, is losing population every year. Below is a table showing the population of Detroit each decade.

| Year (x) | 1960 0 | 1970 10 | 1980 20 | 1990 30 | 2000 40 |
|---|---|---|---|---|---|
| Population (millions) (y) | 1.67 | 1.51 | 1.20 | 1.03 | 0.95 |

Source: U.S. Census Bureau

let x = # years since 1960

a. Find an equation for the regression line.

$y = -0.02x + 1.66$

b. Find the correlation coefficient and explain the meaning of its sign.

$r = -0.98$

Means there is a strong negative correlation between years since 1960 & population of Detroit.

c. Estimate the population of Detroit in 2008.

4. **FARMING** Some crops, such as barley, are very sensitive to how acidic the soil is. To determine the ideal level of acidity, a farmer measured how many bushels of barley he harvests in different fields with varying acidity levels.

| Soil Acidity (pH) $x$ | 5.7 | 6.2 | 6.6 | 6.8 | 7.1 |
|---|---|---|---|---|---|
| Bushels Harvested $y$ | 3 | 20 | 48 | 61 | 73 |

**a.** Find an equation for the regression line. $y = 52.69x - 300.45$

**b.** According to the equation, how many bushels would the farmer harvest if the soil had a pH of 10?

$y = 52.69(10) - 300.45$
$= 226.45$

**c.** Is this a reasonable prediction? Explain.

probably not.
If Alkalinity is too high, production would probably start dropping off.

## 4-7 Inverse Functions

Write the inverse for each of the following functions. Remember to use inverse function notation.

5. $p(x) = 4x - 8$.

$x = 4y - 8$
$\frac{x+8}{4} = \frac{4y}{4}$
$\frac{1}{4}x + 2 = y$
$p^{-1}(x) = \frac{1}{4}x + 2$

6. $f(x) = \frac{2}{3}x + 2$.

$x = \frac{2}{3}y + 2$
$\frac{3}{2}(x-2) = \left(\frac{2}{3}y\right)\frac{3}{2}$
$\frac{3}{2}x - 3 = y$
$f^{-1}(x) = \frac{3}{2}x - 3$

7. $f(x) = 3x - 12$

$y = 3x - 12$
$x = 3y - 12$
$\frac{x+12}{3} = \frac{3y}{3}$
$y = \frac{1}{3}x + 4$
$f^{-1}(x) = \frac{1}{3}x + 4$

8. $g(x) = -\frac{3}{4}x + 6$

$x = -\frac{3}{4}y + 6$
$-\frac{4}{3}(x-6) = \left(-\frac{3}{4}y\right)\left(-\frac{4}{3}\right)$
$-\frac{4}{3}x + 8 = y$
$g^{-1}(x) = -\frac{4}{3}x + 8$

Use composition to determine if the given functions are inverses of one another.

9. $g(x) = 3x - 6$

$f(x) = \frac{1}{3}x + 2$

$g(f(x)) = 3\left(\frac{1}{3}x + 2\right) - 6$
$= x + 6 - 6$
$y = x$ ✓
yes

10. $f(x) = \frac{1}{4}x - 4$

$g(x) = 4x + 8$

$f(g(x)) = \frac{1}{4}(4x + 8) - 4$
$= x + 2 - 4$
$y = x - 2$
no!