

(20pts) NAME (printed neatly): \_\_\_\_\_

(10pts) Section Number (circle correct section): 521<sub>(9:10am)</sub> 522<sub>(10:20am)</sub> 514<sub>(11:30am)</sub> 525<sub>(1:50pm)</sub>

Quiz Grade: \_\_\_\_\_

**For the next three problems:** The table shows the atmospheric concentration of carbon dioxide in parts per million by volume (ppmv) at the Mauna Loa Observatory in Hawaii (<http://cdiac.ornl.gov/ftp/ndp001/maunaloa.co2>).

x	0	5	10	15	20	25	30	35	40
Year	1960	1965	1970	1975	1980	1985	1990	1995	2000
ppmv CO <sub>2</sub>	316.91	320.03	325.68	331.15	338.69	345.9	354.19	360.88	369.48

(10pts) 1. Find the equation of the least-squares (best fit, regression) line, in slope-intercept form, for these data such that x is the number of years after 1960 and y is the ppmv of CO<sub>2</sub>. Give your coefficients to five decimal places. (As always, state any special features or programs you use on your calculator.)

LinReg L1, L2, Y1

$$y = 1.34867x + 313.35000$$

(10pts) 2. Use the unrounded-coefficients of the linear regression line to estimate the ppmv CO<sub>2</sub>, to the nearest whole number that will be produced in the year 2008.

$$Y1(2008 - 1960) = Y1(48) = 378.086$$

In 2008 it is estimated that there will be 378 ppmv of CO<sub>2</sub>.

(10pts) 3. What is the value of the correlation coefficient to five decimal places?

$$r = 0.99473$$

(10pts) 4. The correlation coefficient indicates a \_\_\_\_\_ **strong positive** \_\_\_\_\_ relation between the data points and the regression line.

(Fill in the blank. Hint, the answer is one of the following: strong positive, weak positive, strong negative, weak negative)

5. It costs the Aggie Breeding Company \$64 per acre to cultivate maroon grass and \$256 per acre to cultivate maroon wildflowers. If a third as many acres of maroon wildflowers are planted as acres of maroon grass, how many acres of each should be planted, if the entire cultivation budget of \$7616 is to be used?

a. (10pts) Define your variables.

Let  $x$  = the number of acres of grass

Let  $y$  = the number of acres of wildflowers

b. (10pts) Set up the system of equations.

$$64x + 256y = 7616$$

$$x = 3y \quad \left(\text{or } \frac{1}{3}x = y \text{ or } x - 3y = 0\right)$$

c. (10pts) How many acres of each should be planted?

$$64(3y) + 256y = 7616$$

$$192y + 256y = 7616$$

$$448y = 7616$$

$$y = 17$$

$$x = 3y = 3 * 17 = 51$$

Therefore 51 acres of grass and 17 acres of wildflowers should be planted.

**OR**

$$64x + 256y = 7616$$

$$x - 3y = 0$$

$$64x + 256y = 7616$$

$$- 64x + 192y = 0$$

$$448y = 7616$$

$$y = 17$$

$$x - 3(17) = 0$$

$$x = 51$$

Therefore 51 acres of grass and 17 acres of wildflowers should be planted.

**OR**

$$rref \begin{bmatrix} 64 & 256 & 7616 \\ 1 & -3 & 0 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 0 & 51 \\ 0 & 1 & 17 \end{bmatrix}$$

Therefore 51 acres of grass and 17 acres of wildflowers should be planted.

**OR**

$$\begin{aligned}
 & \begin{bmatrix} 64 & 256 & 7616 \\ 1 & -3 & 0 \end{bmatrix} \xrightarrow[\text{RowSwap}([A],1,2)]{R1 \leftrightarrow R2} \begin{bmatrix} 1 & -3 & 0 \\ 64 & 256 & 7616 \end{bmatrix} \xrightarrow[*\text{row}+(-64, \text{Ans}, 1, 2)]{-64R1+R2 \rightarrow R2} \begin{bmatrix} 1 & -3 & 0 \\ 0 & 448 & 7616 \end{bmatrix} \xrightarrow[*\text{row}(\frac{1}{448}, \text{Ans}, 2)]{\frac{1}{448}R2} \\
 & \begin{bmatrix} 1 & -3 & 0 \\ 0 & 1 & 17 \end{bmatrix} \xrightarrow[*\text{row}+(3, \text{Ans}, 2, 1)]{3R2+R1 \rightarrow R1} \begin{bmatrix} 1 & 0 & 51 \\ 0 & 1 & 17 \end{bmatrix}
 \end{aligned}$$

Therefore 51 acres of grass and 17 acres of wildflowers should be planted.