

(6pts) 1. If $(r + 2p, r, 5, p)$ is the parametric solution to a system of equations, circle all of the following that are particular solutions to this system.

- a. $(0, 0, 5, 0)$
- b. $(3, 1, 5, 2)$
- c. $(8, 2, 5, 3)$
- d. None of these
- e. $(0, -2, 5, 2)$

For the next two problems: During our cold spell in January, I noticed that our outdoor thermometer was off from the actual outside temperature as recorded by the Weather Channel. This data is recorded in this chart.

x, Outdoor thermometer reading in F°	37.9	38.5	44.4	46.0	49.8
y, Actual temperature in F°	32	34	40	43	49

(6pts) 2. Use the *unrounded-coefficients* least-squares line for the data to estimate the actual temperature, to the nearest integer, if the outdoor thermometer reading was $52.8 F^\circ$.

- a. none of these
- b. $53 F^\circ$
- c. $56 F^\circ$
- d. $52 F^\circ$
- e. $51 F^\circ$

(6pts) 3. Circle all of the true statements below.

- a. $r = 0.9868202515$
- b. The correlation coefficient suggests a strong positive correlation.
- c. $r = 0.9933882682$
- d. none of these
- e. The correlation coefficient suggests a weak negative correlation.

_____ (7pts) 4. If the Maroon Company has a break-even point of (100 units, \$8900), production costs of \$24 per unit, and fixed monthly costs of \$6500, find the profit function, $P(x)$, for the company.

For the next three problems: $A = \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}$, $B = \begin{bmatrix} -7 & 8 \\ -4 & 12 \end{bmatrix}$, and $C = \begin{bmatrix} 8 \\ 0 \end{bmatrix}$.

(6pts) 5. Solve for X, if $5B^T + 4X = A$.

- a. none of these
- b. matrix operations undefined
- c. $\begin{bmatrix} 9 & -10 \\ 5 & -15 \end{bmatrix}$
- d. $\begin{bmatrix} 32.25 & 20 \\ -40 & -60 \end{bmatrix}$
- e. $\begin{bmatrix} 9 & 5 \\ -10 & -15 \end{bmatrix}$

(6pts) 6. Solve for X, if $X = C(A - B)$.

- a. matrix operations undefined
- b. $\begin{bmatrix} 64 & -64 \end{bmatrix}$
- c. $\begin{bmatrix} 64 & 32 \end{bmatrix}$
- d. none of these
- e. $\begin{bmatrix} 1.5 & -1 \end{bmatrix}$

(6pts) 7. Solve for (x, y) if $AZ = C$ where $Z = \begin{bmatrix} x \\ y \end{bmatrix}$.

- a. (8, 0)
- b. no solution
- c. none of these
- d. matrix operations undefined
- e. (8, t) where t is any real number

For the next three problems: A simple economy consists of three industries: housing (h), legal services (l), and utilities (u). The input-output matrix for the economy is given below.

$$A = \begin{matrix} & \begin{matrix} h & l & u \end{matrix} \\ \begin{matrix} h \\ l \\ u \end{matrix} & \begin{bmatrix} 0.1 & 0.2 & 0.4 \\ 0.3 & 0.1 & 0.2 \\ 0.3 & 0.2 & 0.3 \end{bmatrix} \end{matrix}$$

(6pts) 8. How many dollars of legal services are used in producing \$50 of all goods (housing, legal services and utilities)?

- a. none of these
- b. \$ 75
- c. \$ 30
- d. \$ 80
- e. \$ 25

_____ (6pts) 9.
Find the production amount, to the nearest dollar, required to meet an outside demand of \$690,000 in housing, \$207,000 in legal services, and \$138,000 in utilities.

_____ (6pts) 10. Find the number of dollars of utilities consumed in the internal process of production to meet the outside demand of \$690,000 in housing, \$207,000 in legal services, and \$138,000 in utilities.

(6pts) 11. When the price of a thingamajig is \$81, the weekly quantity demanded is 4900 and the quantity supplied is 5250. When the price is \$72, the weekly quantity demanded is 5800 and the quantity supplied is 5100. What is the equilibrium price of the thingamajigs?

- a. \$76
- b. \$81
- c. \$78
- d. \$90
- e. none of these

(6pts) 12. Find the equation of the line that passes through the point (4, 8) and is perpendicular to the line $4x - 5y = 35$.

- a. $y = \frac{-5}{4}x + 5$
- b. $y = \frac{-5}{4}x + 13$
- c. $y = \frac{5}{4}x + 3$
- d. none of these
- e. $y = \frac{5}{4}x + 13$

(6pts) 13. If the linear rate of depreciation for a new \$21,200 Camry LE is \$5400 per three years, how much will the Camry be worth in 5 years?

- a. \$12000
- b. \$6000
- c. none of these
- d. \$15800
- e. \$0

(6pts) 14. The following matrices each represent a system of equations. Are the matrices in row-reduced echelon form? If YES, how many solutions are there to the system (ONE, NONE, INFINITE)? If NO, give the best next Gauss-Jordan operation to be performed; you do not need to perform the operation.

a.
$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$
 Row-Reduced Echelon FORM? YES or NO
 If YES, how many solutions? _____
 If NO, what is next GJ operation? _____

b.
$$\begin{bmatrix} 1 & 0 & 0 & 0 & n \\ 0 & 1 & 0 & 0 & p \\ 0 & 0 & 1 & 2 & h \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$
 Row-Reduced Echelon FORM? YES or NO
 If YES, how many solutions? _____
 If NO, what is next GJ operation? _____

c.
$$\begin{bmatrix} 1 & 0 & 0 & 0 & v \\ 0 & 1 & 0 & 6 & k \\ 0 & 0 & 1 & 1 & c \\ 0 & 0 & -5 & -2 & s \end{bmatrix}$$
 Row-Reduced Echelon FORM? YES or NO
 If YES, how many solutions? _____
 If NO, what is next GJ operation? _____

15. Richard and Sherry were planning a 1.5-hour dance practice of the cha-cha, rumba, tango and slow waltzes to burn 844 calories. They wanted to dance twice as many minutes of tangos and waltzes as the other two dances, and dance exactly 38 minutes of rumba and waltz. Dancing the cha-cha requires 15 calories per minute, rumba requires 8 calories per minute, tango requires 10 calories per minute, and a slow waltz requires 6 calories per minute. How many minutes should Richard and Sherry spend on each dance?

a. (10pts) Define the variables and set up the equations.

b. _____ (5pts) How long should they dance their favorite dance, the tango?