## Fall Final Review

## REVIEW IS REQUIRED EVEN IF EXEMPTING!!! (It will be worth a HW grade.)

Show ALL work on separate piece of paper. Review is due on the day of the final exam.
Calculator should be used ONLY on \#1-11.

1. Tasty Bakery sells three kinds of muffins: chocolate chip muffins for $\$ 0.65$ each, oatmeal muffins for $\$ 0.70$ each, and blueberry muffins for $\$ 0.75$ cents each. Charles buys some of each kind and chooses three more chocolate chip muffins than blueberry muffins. If he spends $\$ 6.85$ on 10 muffins, how many of each type of muffin does he buy? Write a system of three equations in three variables. DO NOT SOLVE.
2. The table shows the time spent researching the stock market each week and the average weekly percent gain for an investor over one year.
Find a linear model that represents the data. (Use a graphing calculator \& linear regression.)

| Research (hours) | 6 | 8 | 10 | 12 | 14 | 16 | 18 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Gain (percent) | 2.8 | 4.4 | 4.4 | 4 | 6 | 7.2 | 7.2 |

3. The equation $d=4.9 t^{2}$, gives the distance, in meters, of an object falling in $t$ seconds. How many seconds would it take for an object to fall 107 meters. Round to the nearest hundredth.
4. The cost of a field trip is $\$ 150$ plus $\$ 11$ per student. If the school can spend at most $\$ 700$, how many students can go on the field trip?
5. The range of a car is the distance $R$ in miles that a car can travel on a full tank of gas. The range varies directly with the capacity of the gas tank $C$ in gallons.
a. Find the constant of variation for a car whose range is 306 mi with a gas tank that holds 18 gal.
b. Write an equation to model the relationship between the range and the capacity of the gas tank.
6. A balloon takes off from a location that is 21 ft above sea level. It rises $42 \mathrm{ft} / \mathrm{min}$. Write an equation to model the balloon's elevation $h$ as a function of time $t$.
7. Two stores carry small, medium, and large t-shirts. The table shows the inventory at the stores. Display the data in matrix form. Give the dimensions of the matrix.

| T-Shirt Inventory |  |  |  |
| :--- | :---: | :---: | :---: |
|  | Small | Medium | Large |
| Store A | 10 | 23 | 18 |
| Store B | 17 | 31 | 26 |

8. Leona's Diner offers 8 -piece, 12 -piece, and 16 -piece family chicken meals. The table below lists the costs of three different orders. What is the price of each kind of meal?

| 8 -piece | 12-piece | 16-piece | Total cost |
| :--- | :--- | :--- | :--- |
| 3 | 1 | 1 | $\$ 65$ |
| 2 | 2 | 3 | $\$ 110$ |
| 3 | 3 | 1 | $\$ 95$ |

9. A rental car agency charges a flat fee of $\$ 34.00$ plus $\$ 2.00$ per day to rent a certain car. Another agency charges a fee of $\$ 29.00$ plus $\$ 3.25$ per day to rent the same car. Write a system of equations to represent the cost $c$ for renting a car at each agency for $d$ days. Then find the number of days for which the costs are the same. Round your answer to the nearest whole day.
10. Dalco Manufacturing estimates that its weekly profit, $P$, in hundreds of dollars, can be approximated by the formula $P=-3 x^{2}+6 x+5$, where $x$ is the number of units produced per week, in thousands.
a. How many units should the company produce per week to earn the maximum profit?
b. Find the maximum weekly profit.
11. In an experiment, a petri dish with a colony of bacteria is exposed to cold temperatures and then warmed again.
a. Find a quadratic model for the data in the table.
b. Use the model to estimate the population of bacteria at 9 hours.

| Time (hours) | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Population (1000s) | 5.1 | 3.03 | 1.72 | 1.17 | 1.38 | 2.35 | 4.08 |

Evaluate the expression for the given value of the variable(s).
12. $|4 b-4|+\left|3-b^{2}\right|+2 b^{3} ; b=2$
13. $-x^{2}-4 x-4 ; x=-3$

Simplify by combining like terms.
14. $-3(-4 y+3)+7 y$

Solve the equation.
15. $3 y+20=3+2 y$
16. $6(x-0.8)-0.2(5 x-4)=6$
17. $4 x^{2}+9=0$
18. $x^{2}+8 x+16=36$
19. $4 x^{2}+9=0$
20. $x^{2}+4 x+4=64$

Solve for $x$. State any restrictions on the variables.
21. $a x+b x+9=7$

Solve the inequality. Graph the solution.
22. $|2 x-4| \leq 6$
23. $|2 x+2| \geq 22$
24. Suppose $f(x)=4 x-2$ and $g(x)=-2 x+1$.

Find the value of $\frac{f(-2)}{g(3)}$.
Find the slope of the line through the pair of points.
25. $(6,12)$ and $(-6,-2)$
26. $(-5,-8)$ and $(4,-4)$

Find the slope of the line.
27. $6 x+2 y=-9$
28. $-2 x-4 y=7$

Find an equation for the line:
29. through $(2,6)$ and perpendicular to $y=-\frac{5}{4} x+1$.
30. through $(-4,6)$ and parallel to $y=-3 x+4$

Determine whether $\boldsymbol{y}$ varies directly with $\boldsymbol{x}$. If so, find the constant of variation $k$.
31. $\mathrm{y}=1.2 \mathrm{x}$
32. $-6 y=-5 x$
33. $-y=-5 x+3$

Solve the system by the method of substitution.
34. $\left\{\begin{aligned}-3 x-3 y+2 z & =-7 \\ z & =1 \\ -2 x-3 y+z & =-6\end{aligned}\right.$

## Use the elimination method to solve the system.

35. $\left\{\begin{array}{l}-4 x+4 y=-8 \\ x-4 y=-7\end{array}\right.$
36. $\left\{\begin{array}{l}-3 x-2 y=3 \\ x-2 y=-1\end{array}\right.$
37. State the dimensions of the matrix. Identify the indicated element.
$A=\left[\begin{array}{ll}-9 & 4 \\ -7 & 0 \\ -8 & 8\end{array}\right], a_{2,1}$

Find the sum or difference.
38. $\left[\begin{array}{cc}-3 & 0 \\ 5 & -7\end{array}\right]+\left[\begin{array}{ll}-4 & 2 \\ -1 & 8\end{array}\right]$
39. $\left[\begin{array}{cc}4 & 7 \\ -5 & 1\end{array}\right]-\left[\begin{array}{cc}-3 & -2 \\ 0 & 6\end{array}\right]$

Find the values of the variables.
40. $\left[\begin{array}{cc}3+t & 0 \\ 8 & -10\end{array}\right]=\left[\begin{array}{cc}-5 & 0 \\ 8 & -2 y+2\end{array}\right]$

## Solve the matrix equation.

41. $\left[\begin{array}{cc}-1 & -7 \\ 1 & -2\end{array}\right]-X=\left[\begin{array}{cc}1 & 4 \\ -6 & 5\end{array}\right]$
42. $X+\left[\begin{array}{ccc}2 & -5 & 8 \\ -8 & 3 & 0\end{array}\right]=\left[\begin{array}{ccc}6 & -1 & 9 \\ -5 & 2 & 8\end{array}\right]$

Find the product.
43.
$\left[\begin{array}{ll}5 & 2 \\ 5 & 3\end{array}\right]\left[\begin{array}{ll}-6 & 2 \\ -3 & 9\end{array}\right]$

Evaluate the determinant of the matrix.
44. $\left[\begin{array}{lll}2 & 5 & -8\end{array}\right]\left[\begin{array}{c}-6 \\ 8 \\ 2\end{array}\right]$
45. $\left[\begin{array}{cc}4 & -1 \\ -9 & 2\end{array}\right]$
46. $\left[\begin{array}{cc}-3 & -4 \\ 1 & 2\end{array}\right]$

Determine whether the matrix has an inverse. If an inverse exists, find it.
47. $\left[\begin{array}{cc}-5 & -18 \\ 2 & 7\end{array}\right]$ 48. $\left[\begin{array}{ll}2 & 4 \\ 1 & 3\end{array}\right]$

Determine whether the function is linear or quadratic. Identify the quadratic, linear, and constant terms.(\#49-50)
49. $y=(x+1)(6 x-6)-6 x^{2}$
50. $y=(x+5)(2 x+1)-2 x$
51. Write $y=2 x^{2}+12 x+14$ in vertex form.
52. Write $y=3 x^{2}-12 x+14$ in vertex form.

Factor the expression.
53. $-15 x^{2}-21 x$
55. $x^{2}+14 x+48$
57. $3 x^{2}+26 x+35$
59. $9 x^{2}-16$

Simplify the expression.
61. $(-1+6 i)+(-4+2 i)$
63. $(2+5 i)(-1+5 i)$
65. Find the missing value to complete the square.
$x^{2}+2 x+$ $\qquad$
Solve the quadratic equation by completing the square.
67. $x^{2}+10 x+14=0$
68. $x^{2}+10 x+35=0$

Use the Quadratic Formula to solve the equation.
69. $5 x^{2}+9 x-2=0$
70. Given the system of constraints, name all vertices. Then find the maximum value of the objective function $C=4 x-3 y$
$\left\{\begin{array}{l}x \geq 0 \\ y \geq 0 \\ 6 x-2 y \leq 12 \\ 4 y \leq 4 x+8\end{array}\right.$
Match each equation/inequality with its graph. Not all of the graphs will be used.
$\qquad$ 71. $y=-2.5$
72. $y=|x-3|$
73. $y=(x-3)^{2}$
$\qquad$ 74. $y=\frac{3}{4} x+3$
75. $y=-2(x-3)^{2}-2$
76. $y=x^{2}-3$
77. $y=|x+3|$
78. $x=-2.5$
79. $y=-2(x+3)^{2}+2$
$\qquad$ 80. $y \leq-2|x+2|+1$
A)
B)
C)
D)




E)
F)
G)
H)




I)
J)
K)
L)


Fall Final Review
Answer Section

1. $\mathrm{c}+\mathrm{o}+\mathrm{b}=10$
$.65 c+.70 \mathrm{o}+.75 \mathrm{~b}=6.85$
$\mathrm{c}=\mathrm{b}+3$
2. $y=.36 x+.77$
3. whole numbers, integers, rational numbers, real numbers
4. 50 students
5. $17 \mathrm{mi} / \mathrm{gal} ; R=17 C$
6. $h=42 t+21$
7. $\left[\begin{array}{lll}10 & 23 & 18 \\ 17 & 31 & 26\end{array}\right]$

The dimensions are $2 \times 3$.
8. 8 -piece $=\$ 10,12$ -
piece $=\$ 15$, 16-piece $=\$ 20$
9. a. $\left\{\begin{array}{l}c=2.00 d+34.00 \\ c=3.25 d+29.00\end{array}\right.$
b. 4
10. 1,000 units; $\$ 800$
11.
a. $P=0.38 x^{2}-2.45 x+5.10$
b. 13,830 bacteria
12. 21
13. -1
14. $19 y-9$
15. -17
16. 2
17. $-\frac{3}{2} i, \frac{3}{2} i$
18. $2,-10$
19. $-\frac{3}{2} i, \frac{3}{2} i$
20. $6,-10$
21. $x=\frac{-2}{a+b} ; a \neq-b$
-22. $\mathrm{x} \leq 5$ and $\mathrm{x} \geq-1$

23. $x \leq-12$ or $x \geq 10$

24. 2
25. $\begin{array}{r}7 \\ 6\end{array}$
26. $\begin{array}{r}4 \\ 9\end{array}$
27. -3
28. $-\frac{1}{2}$
29. $y=\frac{4}{5} x+\frac{22}{5}$
30. $y=-3 x-6$
31. yes; $k=1.2$
32. yes; $\mathrm{k}=\frac{5}{6}$
33. no
34. $(2,1,1)$
35. $(5,3)$
36. $(-1,0)$
37. $3 \square \square 2,-7$
38. $\left[\begin{array}{cc}-7 & 2 \\ 4 & 1\end{array}\right]$
39. $\left[\begin{array}{cc}7 & 9 \\ -5 & -5\end{array}\right]$
40. $t=-8, y=6$
41. $\left[\begin{array}{cc}-2 & -11 \\ 7 & -7\end{array}\right]$
42. $\left[\begin{array}{ccc}4 & 4 & 1 \\ 3 & -1 & 8\end{array}\right]$
43. $\left[\begin{array}{ll}-36 & 28 \\ -39 & 37\end{array}\right]$
44. [12]
45. -1
46. -2
47. $\left[\begin{array}{cc}7 & 18 \\ -2 & -5\end{array}\right]$
48. $\left[\begin{array}{cc}3 / 2 & -2 \\ -1 / 2 & 1\end{array}\right]$
49. linear function linear term: $0 x$ constant term: -6
50. quadratic function
quadratic term: $2 x^{2}$
linear term: $9 x$
constant term: 5
51. $y=2(x+3)^{2}-4$
52. $y=3(x-2)^{2}+2$
53. $-3 x(5 x+7)$
54. $-4\left(-2 x^{2}-3 x+4\right)$
55. $(x+6)(x+8)$
56. $(x-2)(x-4)$
57. $(3 x+5)(x+7)$
58. $(5 x+3)(x-5)$
59. $(3 x+4)(3 x-4)$
60. $(2 x+3)^{2}$
61. $-5+8 i$
62. $-1-9 i$
63. $-27+5 i$
64. $3-7 i$
65. 1
66. 144
67. $-5 \pm \sqrt{11}$
68. $-5 \pm i \sqrt{10}$
69. $\frac{1}{5},-2$
70. $(0,2),(2,0),(4,6)$; maximum value of 8
71. C
72. 72. D
73. G
74. A
75. B
76. I
77. H
78. K
79. J
80. L

