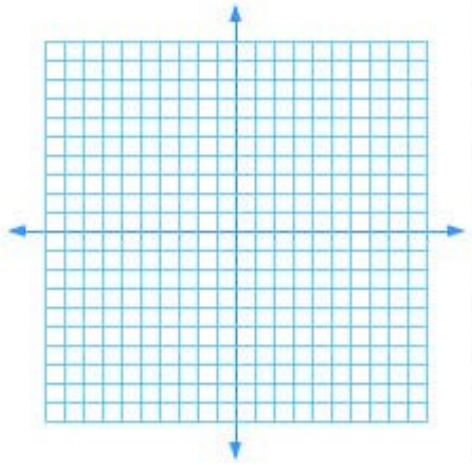
Unit V Journal—Chapter 9/Supplements **Name _____**

Respond to each item, giving sufficient detail. Neatly handwrite your responses. *This should be very helpful to you as you prepare for exams.*

1. Refer to the coordinate grid.



Plot the following points and name their quadrant (or axis).

A (4, 7) _____

B (-3, -1) _____

C (0, -8) _____

A **function** describes how a dependent variable changes with respect to one or more independent variables. If the dependent variable (y) is a function of the independent variable (x), we write the function as

y = _____

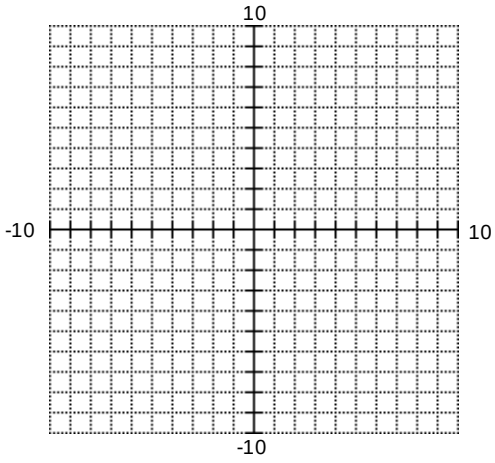
The _____ of a function is the set of values that both make sense and are of interest for the independent variable.

The **range** of a function consists of the values of the _____ variable that correspond to the values in the domain.

2. Complete the table with 3 ordered pairs that satisfy this function, and then draw a complete graph.

y = -2x + 7 or 2x + y = 7

x	y



3. To find the **y-intercept** of a line, I set _____ equal to 0 and then solve for _____ .

To find the **x-intercept** of a line, I set _____ equal to 0 and then solve for _____ .

P.S. These principles work for linear and non-linear functions and relations.

Show how to find the intercepts for the line in #2: $2x + y = 7$

4. Describe the meaning of **slope** and how to find it given two points (x_1, y_1) and (x_2, y_2).

Meaning: _____

Formula: _____

Also include the 4 general slope cases along with a drawing for each.

Write the equation of <u>any line</u> parallel to the graph of $y = -\frac{3}{2}x + 4$. _____

Write the equation of <u>any line</u> perpendicular to the graph of y = -3.

What is the slope of the line in #2. _____

5. Write the 3 forms of **linear equations** along with the meanings of the constants in each formula.

Slope-intercept form: _____ m: slope b: _____

Standard form: _____ A, B, C are real numbers

Point-slope form: _____ Point: (x_1, y_1) Slope: m

6. For the following linear equation, find the slope, x- and y-intercept. Show your work.

$y = \frac{1}{2}x - 3$ Slope = _____ x-intercept = _____ y-intercept = _____

7. An **application** involving linear functions involves the relationship between Celsius and Fahrenheit temperature measurements. A common formula (in slope-intercept form) is $F = \frac{9}{5}C + 32$. Interpreting the slope and y-intercept of this linear function, if the temperature increases 5°C, the temperature increases _____ °F (interpreting the meaning of the slope concept), and 0°C = _____ °F (interpreting the y-intercept concept).

Another application involves uniform motion. Write the linear formula relating distance (d) and time (t) for a fixed rate of speed, r = 65 mph. d = _____

Another common application involves cost structures. For example, an automobile mechanic may charge $165 for parts and $45 an hour for labor. Write the corresponding formula, with C for cost and t for time in hours. C = _____

8. One of the stages involved in **linear regression** using the TI Plus graphing calculator is entering the data. What set of keystrokes takes you to the L1, L2 lists?

_____

Once you enter the ordered pairs into lists, what set of keystrokes on the calculator takes you to the selection of the x-y scatter plot? Answer: [2nd] [Y=] (STAT PLOT)

Once you make a reasonable WINDOW for your data, the major regression step is the command:

_____

The correlation coefficient is given by the symbol _____ and describes the type and strength of relationship between the dependent variable y and the independent variable x.

If y decreases as x increases, the relationship is negative; if y increases as x increases, the relationship is _____ .

The strength of the relationship is determined by how close | r | is to _____. The correlation coefficient is calculated by the TI Plus when “Diagnostics On” is selected.

9. When checking the quality of a linear model for predictions (whether dealing with a line through the first and last point, a line through any other two points, or the line of best fit), we evaluate using SSE and average error.

How do you find error?_____

What does SSE represent? _____

Give the formula for average error.

10. For a **quadratic function**, vertex (or standard) form is y = ___(x – ___)^2 + ___ .

The coordinates of the vertex of the corresponding parabola are _____ .

The axis (line) of symmetry is given by the equation _____ .

After setting y equal to 0, what technique is <u>most natural</u> for finding any x-intercepts? Choose from among: factoring/the zero product property, the square root property, completing the square, and the quadratic formula. _____

How do you find the y-intercept of the parabola? Substitute 0 for ____ and solve.

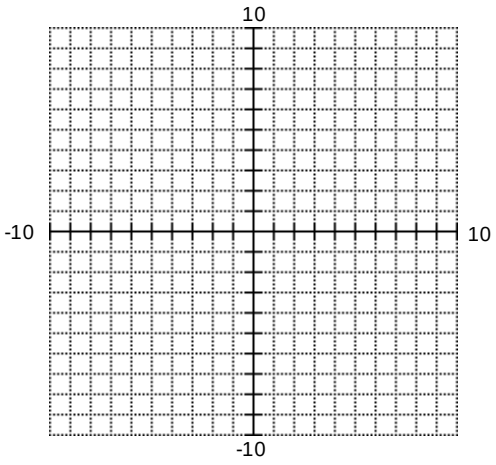
11. Find the following features of the parabola given by y = -(x + 1)^2 + 4. Show work to support the intercepts. Then graph the parabola.

vertex: _____

axis of symmetry: _____

x-intercepts: _____ & _____

y-intercept: _____



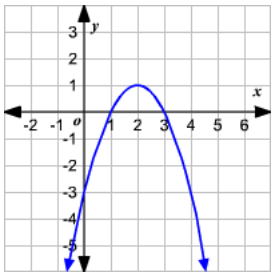
12. For a quadratic function, the general form is y = _____ , where $a \neq 0$.

Give the general formulas we use to find the vertex of the parabola. h = _____ , k = f(h)

Using this form, the y-intercept is given by the ordered pair _____ .

The axis (line) of symmetry is given by the equation _____ .

More about x-intercepts on the next problem . . .



Bonus (+2): Find the equation of the parabola in the grid above.

_____

13. After setting y equal to 0, what two techniques are <u>most natural</u> for finding any x-intercepts? Choose from among: factoring/ the zero product property, the square root property, completing the square, and the quadratic formula.

(1) <u>factoring/zero product property</u>

(2) _____

Complete the quadratic formula: $x = \dfrac{-b \pm \sqrt{\quad}}{\quad}$

Find the x-intercepts of the following two parabolas, showing 2 of the methods listed above.

(a) $y = x^2 + 4x - 5$

(b) $y = x^2 + 4x + 2$

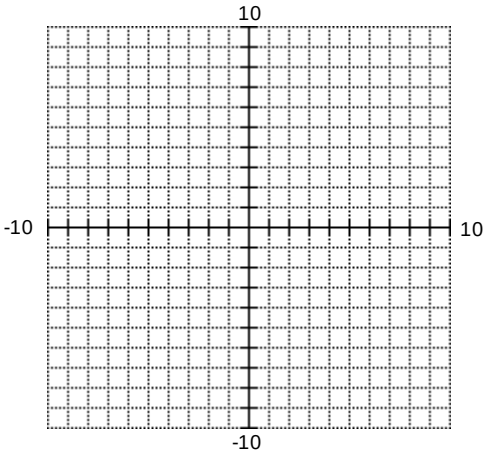
14. Graph the parabola given by $y = x^2 + 4x - 5$. Include and clearly label all 4 features.

vertex: _____

axis of symmetry: _____

x-intercepts (from #13a): _____

y-intercept: _____



15. Complete the following list of 3 realistic applications of quadratic functions, along with corresponding examples of formulas.

(1) Projectile Motion (height in feet vs. time in sec) $H = -16t^2 + 80t + 200$

(2) Area of a Circle (vs. radius) _____

(3) Quadratic Regression (Roller Coaster Data) _____

16. Write a few sentences describing something you learned that was new for you in class this unit. You may include a favorite activity, an interesting application, a teaching and learning technique, or a specific concept that you better understand as a result of this unit.

17. Now think back over the entire course. Write a few sentences describing something you learned that was new for you in class. You may include a favorite activity, an interesting application, a teaching and learning technique, or a specific concept that you better understand as a result of this course.

One thing Professor Clement should continue doing is . . .

One thing Professor Clement should consider changing is . . .

Do your best! Rise to the challenge! Live and learn!