Final Exam Review Supplement

1. When you have a quadratic function in vertex form, do you know what all the parts mean?

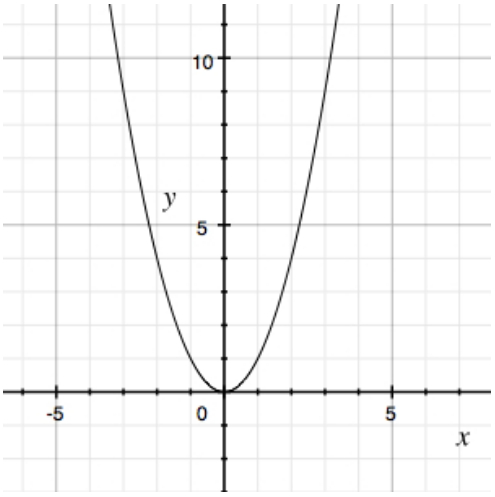
Example: $f(x) = 3(x - 4)^2 + 5$

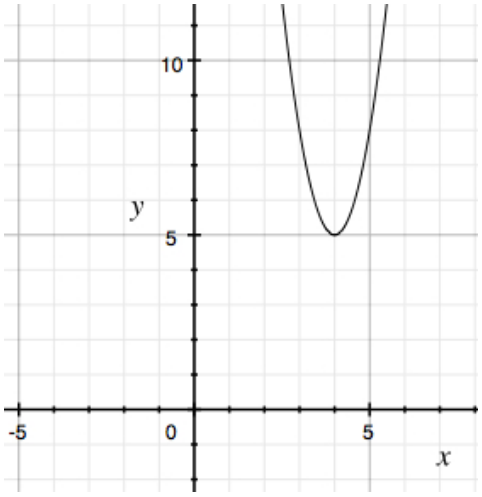
$a = 3$ This is the coefficient of x^2. It tells you the direction the parabola opens (+ up, – down) and whether it is stretched (> 1), made skinnier because the y-coordinates are farther apart, or squashed(< 1), made wider because the y-coordinates are closer together.

$(h, k) = (4, 5)$ This ordered pair is the location of the vertex. The x-coordinate of the vertex is h and the y-coordinate is k. Since h is on the same side of the equation as x, it has the opposite sign in the vertex form than it does on the graph. Since k is on the opposite side of the equation as f(x), it has the same sign as it does on the graph.

Standard quadratic function graph is given as $y = f(x) = x^2$.

Let's see what happens when we compare the graphs of the standard quadratic with the vertex form example above.





$y = f(x) = x^2$

$f(x) = 3(x - 4)^2 + 5$

2. Enterprise rents a standard size car (6-passenger) for $25.50 per day plus $25 when driven more than 10 miles. Calculate the price, not including tax, for the following rentals:
a) rent for 1 day, drive < 10 miles
b) rent for 1 day, drive 20 miles

a) $25.50, and b) $50.50

Write a function that computes renting the car for one day and driving x miles:
There are 2 pieces to computing the cost: the first is daily rate and the next is number of miles. The daily rate does not change since you are renting for 1 day, but the cost of the rental does change once you drive 10 miles or more. Therefore, your function needs to show both situations, renting for 1 day and driving less than 10 miles and renting for 1 day while driving more than 10 miles. You need a 2-stage function based on the number of miles driven. A function that models a process of more than one stage is called a piecewise defined function.

For our example:

$$f(x) = \begin{cases} 25.50 & 0 < x < 10 \\ 25.50 + 25.00 & x \geq 10 \end{cases}$$

Here is another example. Write a function that determines the fare for one trip:

Rover Bus Fares*

Type	Fee ($)
Adult	1.00
Student (Ages 6 - 16 only ID may be required)	0.50
Senior Citizen (Ages 65+ ID may be required)	0.50
Individuals with Disabilities (ID may be required)	0.50
Children (Ages 5 and under with adult)	Free
Transfers (Good at designated transfer locations only)	Free

*Exact fare is required

Bus Tickets	Fee ($)
Strip of 10 Regular Tickets	8.00
Strip of 10 Special Tickets	4.00

Valid for seniors 65+, individuals with disabilities and students 6 - 16 ID may be required

3. A function that is 1-t-1 has an inverse; a function that is NOT 1-to-1, such as a quadratic function, does NOT have an inverse. All linear functions that have a positive or negative slope are 1-to-1, some cubic functions (biggest exponent is a 3) are also. NO quadratics function is 1-to-1.
Example: Let $f(x) = 15x - 400$ compute the profit from the sales of x number of a product.

What does x represent?

What does f(x) represent?

Find $f^{-1}(x)$:

What does $f^{-1}(x)$ compute?

4. In the following formula, y is the minimum number of hours per week working on mml assignments for 1710 in order to get all items correct on x number of units.

$y = 1.5x/(14 - x)$

How many hours would need to be spent to get all items correct on 3 units?

To get all 6 units @ 100% correct?

5. A fair die has sides numbered 1 – 6. If the die is rolled twice, what is the probability that the first number is a 2 and the second is a 5?

Compute the probability of rolling a 2:

Compute the probability of rolling a 5:

Multiply the two together to get the probability of rolling a 2 then a 5:

6. Write the system of linear equations that the augmented matrix represents:

3	1	2	100
3	2	1	110
2	1	2	80

7. Solve the logarithmic equation symbolically. {REMEMBER: a logarithm is an exponent. You need to review the Rules of Exponents!}

$\ln x^3 + \ln x^5 = 8$

8. Use the discriminant to determine the number of Real solutions: $4x^2 = 6 - 3x$

Quadform: a = b = c = the discriminant is:

When the Discriminant is + the quadratic has 2 Real solutions; when 0 it has 1 Real solution; and when – it has NO Real solutions.

Use common or natural logarithms to solve the equation symbolically.

9. $2^{(16-4x)} = 256$

What is your base? What is your exponent? What is your product?

10. Bicyclists J and V are both traveling in the same direction. Their distance from SAG after x hours are computed by the functions f(J) and f(V), respectively, and their graphs are shown in the figure for $0 < x < 10$. During what time interval is cyclist J farther away from SAG then cyclist V?