MAT1033C Intermediate Algebra

Graphing Nonlinear Equations

To graph nonlinear equations in two variables…

1. Assume a value for one of the variables (either x or y), then solve for the value of the other variable.*
2. Express these values of x and y as an ordered pair.
3. Repeat Steps 1 and 2 until you have "enough" points**
4. Determine the scale of the x-axis and the y-axis
5. Plot the ordered pairs
6. Connect the points to graph the equation

* If the equation starts with "$y =$", then assume values for x. But if the equation starts with "$x =$", then assume values for y.

** If the equation is linear, two or three points is "enough." If the equation is non-linear, many more points are needed.

As a Class: MyMathLab Study Plan Problem 3.1.45

Determine whether the equation is linear or not. Then graph the equation by finding and plotting ordered-pair solutions.

$y = |x|$.

Hint: This equation is an absolute value graph and should have a "V"-shape. *Be sure to pick values of* x *that show this shape!*


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Save
desmos
1
$y = x^2$
2
$y = a(x-h)^2 + k$
3
$a = 1$
−10
10
4
$h = 1$
−10
10
5
$k = 1$
−10
10
6
$y = |x|$
7
$y = |x-h| + k$
-10
-8
-6
-4
-2
0
2
4
6
4
2
-2

MAC1105 College Algebra

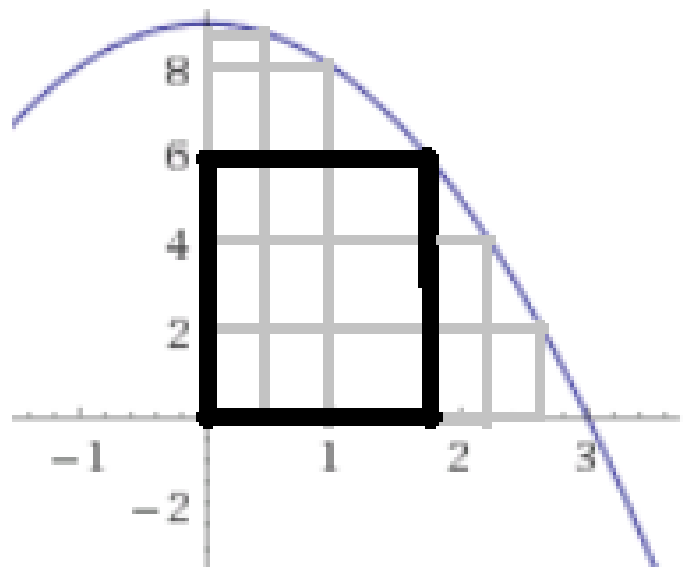
Build and Analyze Functions (Type 2: Area Determined by a Point on a Function")

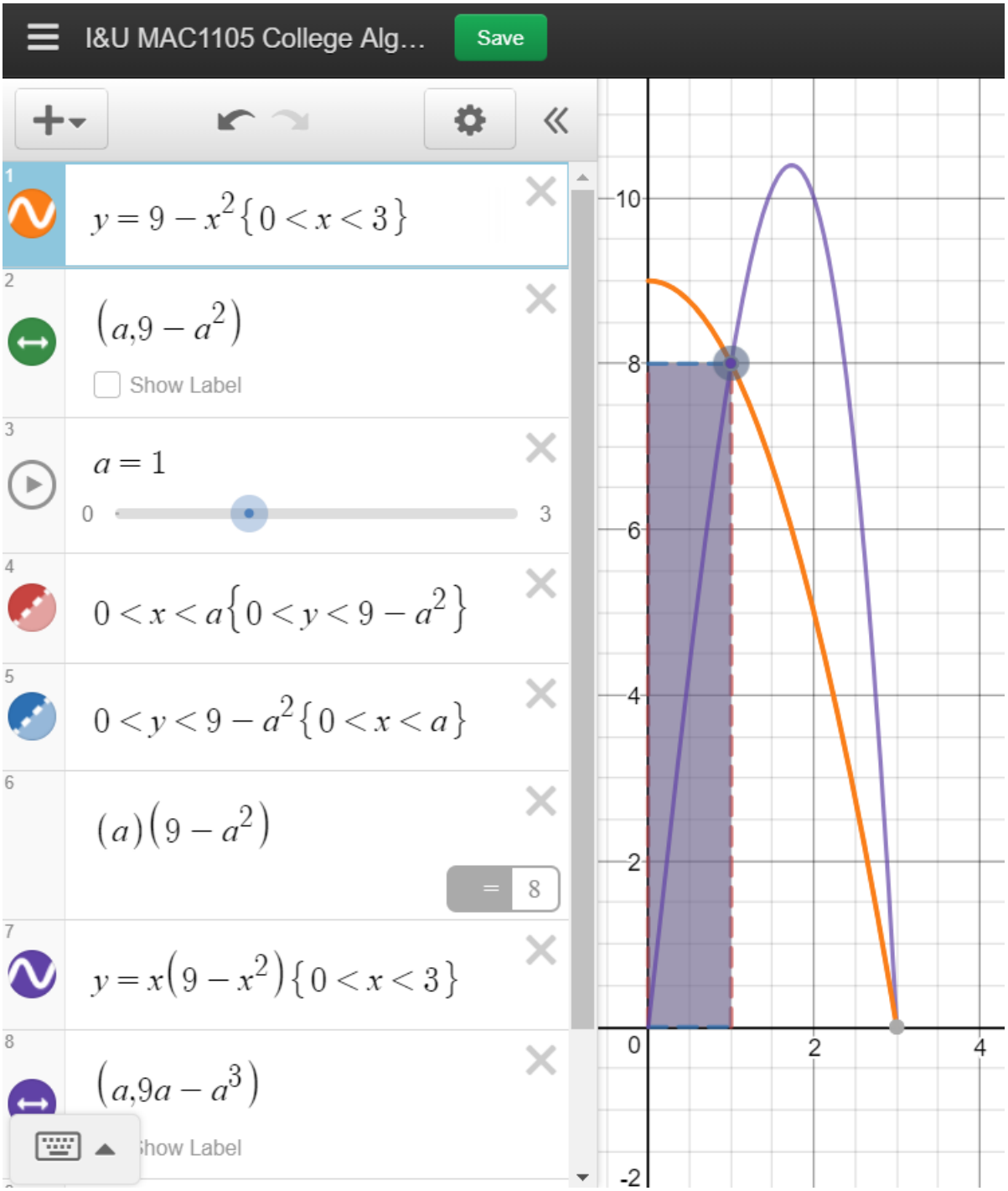
For Type 2 problems, the point (x, y) on the function is a point on a geometric shape. If that shape is a rectangle, then the area of that rectangle is length times width. Since the length is x and the width is y, we use the formula $A = xy$. If that shape is a triangle instead, then the area is one-half the base times the height. Since the base is x and the height is y, we use the formula $A = \frac{1}{2}xy$. In either case, we replace y with whatever it is equal to in the given equation, then simplify.

As a Class: MyMathLab Study Plan Problems 3 and 4

A rectangle has one corner on the graph of $y = 9 - x^2$, another at the origin, a third on the **positive** y-axis, and the fourth on the **positive** x-axis (see the figure).

(a) Express the area A of the rectangle as a function of x.
(b) What is the domain of A?
(c) Using a graphing utility, graph $A(x)$.
(d) For what value of x is A largest?

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Save
1
$y = 9 - x^2 \{0 < x < 3\}$
2
$(a, 9 - a^2)$
Show Label
3
$a = 1$
0
3
4
$0 < x < a \{0 < y < 9 - a^2\}$
5
$0 < y < 9 - a^2 \{0 < x < a\}$
6
$(a)(9 - a^2)$
= 8
7
$y = x(9 - x^2) \{0 < x < 3\}$
8
$(a, 9a - a^3)$
Show Label
10
8
6
4
2
0
2
4
-2

MAC1114 College Trigonometry

Transform Trigonometric Functions

When the function $f(x) = \sin x$ is transformed, one new form is $f(x) = a\sin(bx + c)$ where a, b, and c are real numbers. What effect does each of these real numbers have on the graph? Fill in the blanks in the sentences below.

When a is adjusted the graph _____.

When b is adjusted the graph _____.

When c is adjusted the graph _____.

When the value of a is positive, _____.

When the value of a is negative, _____.

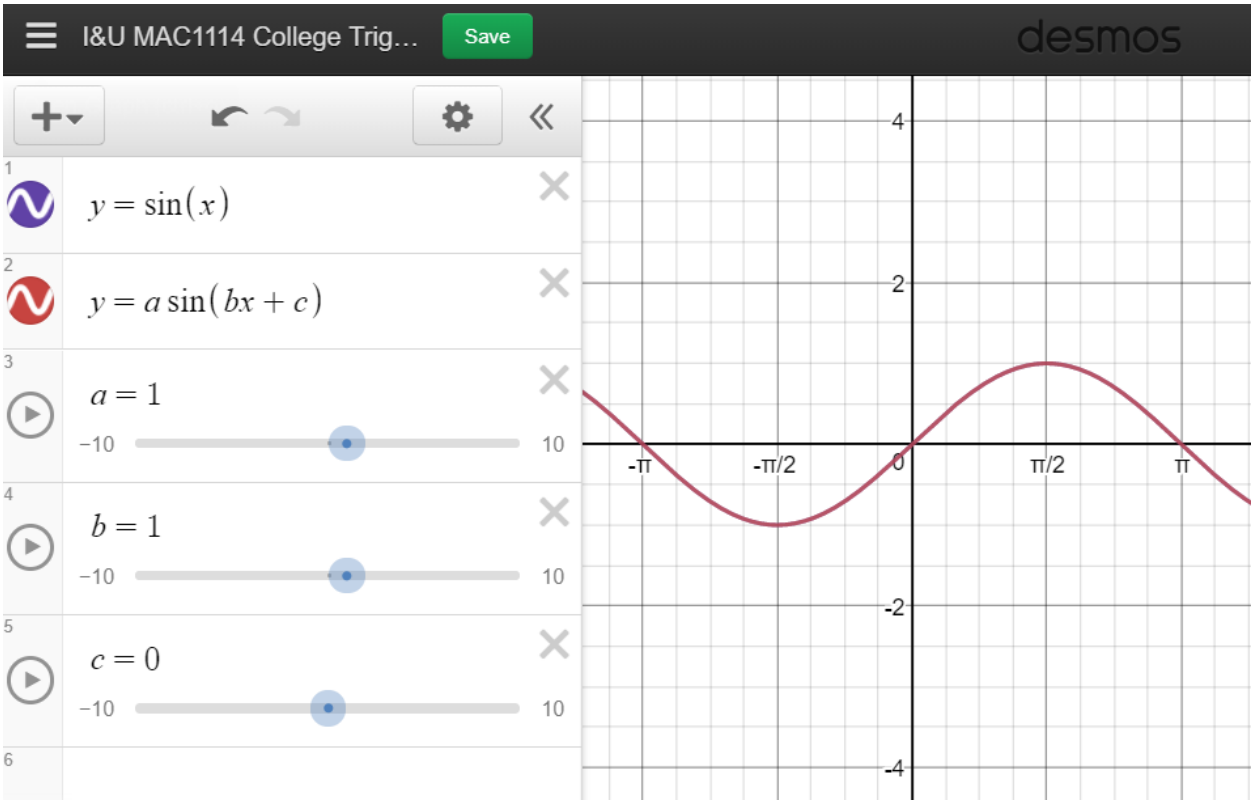
When the value of b is close to zero, _____.

When the value of b is far from zero, _____.

When the value of b equals zero, _____.

When the value of c is positive, _____.

When the value of c is negative, _____.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desmos
1
$y = \sin(x)$
2
$y = a\sin(bx + c)$
3
$a = 1$
−10
10
4
$b = 1$
−10
10
5
$c = 0$
−10
10
6
4
2
-2
-4
-π
-π/2
0
π/2
π

MAC2311 Calculus I

Understand the Relationship Between the Derivative, the Secant Line, and the Tangent Line.

For the function $f(x) = x^2 + x + 2$, find the derivative $f'(x)$ using the definition of the derivative. Then evaluate $f'(x)$ at $x = 0$. Finally, find the equation of the tangent line to $f(x)$ at $x = 0$.

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

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

$$= \lim_{h \to 0} \frac{(x+h)^2 + (x+h) + 2 - (x^2 + x + 2)}{h}$$

$$= \lim_{h \to 0} \frac{x^2 + 2hx + h^2 + x + h + 2 - x^2 - x - 2}{h}$$

$$= \lim_{h \to 0} \frac{2hx + h^2 + h}{h}$$

$$= \lim_{h \to 0} 2x + h + 1$$

$f'(x) = \boxed{2x + 1}$

$f'(0) = 2(0) + 1 = \boxed{1}$

To find the tangent line, note that…

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

$f(0) = 0^2 + 0 + 2 = 2$

So at the point $(0,2)$*, the slope is 1. Putting these in the point-slope form give the equation of the tangent line,* $\boxed{y - 2 = 1(x - 0)}$*, which simplifies to* $y = x + 2$*.*

To find the secant line through $(0, f(0))$ and $(0 + h, f(0 + h))$, note that…

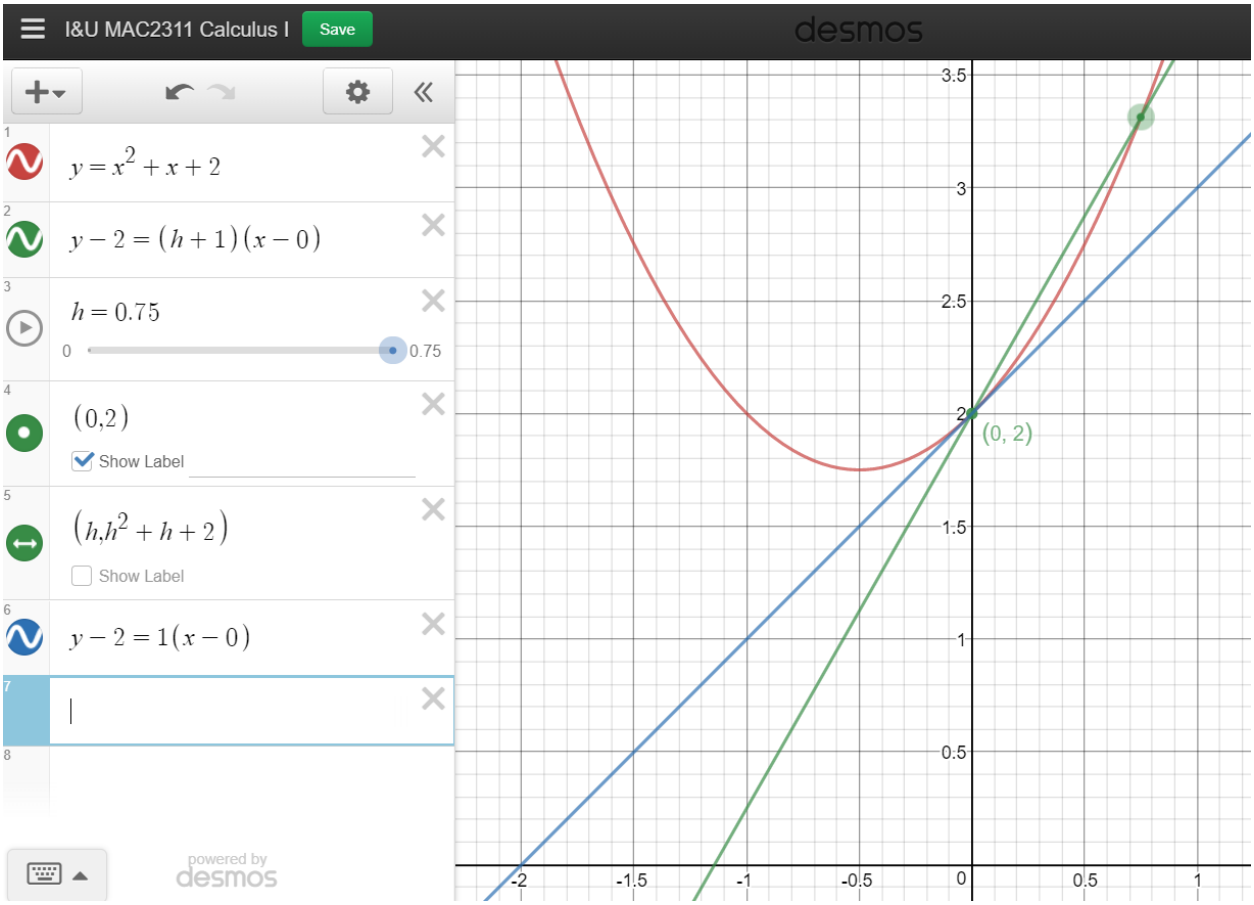
$(0, f(0))$ is $(0,2)$ and $(0 + h, f(0 + h))$ is $(h, h^2 + h + 2)$.

Therefore the secant line from $(0,2)$ *to* $(h, h^2 + h + 2)$ *has slope*

$$m = \frac{h^2 + h + 2 - 2}{h} = \frac{h^2 + h}{h} = h + 1$$

Using this slope with the point-slope formula, the equation of the secant line is therefore

$\boxed{y - 2 = (h + 1)(x - 0)}$*, which simplifies to* $y = hx + x + 2$*.*


I&U MAC2311 Calculus I
Save
desmos
1
$y = x^2 + x + 2$
2
$y - 2 = (h + 1)(x - 0)$
3
$h = 0.75$
0
0.75
4
$(0,2)$
Show Label
5
$(h, h^2 + h + 2)$
Show Label
6
$y - 2 = 1(x - 0)$
7
8
powered by
desmos
(0, 2)
3.5
3
2.5
2
1.5
1
0.5
-2
-1.5
-1
-0.5
0
0.5
1