

Work each of these problems **on this document** and **turn it in on 2 February 2016 at 11 am**.

You should work this assignment in pencil so that you can erase and correct any errors (as opposed to scribbling out work). When writing your solutions, keep in mind the notational and formatting issues discussed and illustrated in lecture and lab; your solution will be evaluated for your success at using correct notation, your success at showing all relevant supporting work, and your success at using appropriate organizational strategies as well as for your success at coming up with a “correct answer.”

3.4.1 Exercises

Determine the unit for the first derivative function for each of the following functions. **Write your answers in complete sentences.** Remember, *we do not simplify derivative units in any way, shape, or form*. This first problem has been done for you as an example. Please practice the prime notation when answering the other three.

1. $V(r)$ is the volume of a sphere (measured in mL) with radius r (measured in mm).

$$\text{The unit for } V'(r) \text{ is } \frac{\text{mL}}{\text{mm}}.$$

2. $A(x)$ is the area of a square (measured in ft^2) with sides of length x (measured in ft).

3. $V(t)$ is the volume of water in a bathtub (measured in gal) where t is the amount of time that has elapsed since the tub began to drain (measured in minutes).

4. $R(t)$ is the rate at which a bathtub is draining (measured in gal/min) where t is the amount of time that has elapsed since the tub began to drain (measured in minutes).

3.2.1 Exercises

Consider the function $g(x) = 5 - \sqrt{4 - x}$.

1. Find the slope of the tangent line shown in Figure 3.2.3 using $m_{\text{tan}} = \lim_{h \rightarrow 0} \frac{g(3+h) - g(3)}{h}$. Show work consistent with that illustrated in example 3.2.1.

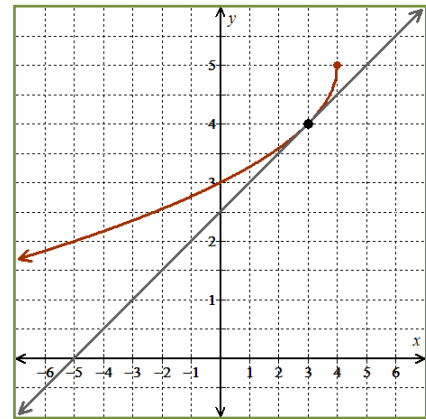


Figure 3.2.3: g

3. State the equation of the tangent line to g at 3 (in a complete sentence!).

3.3.1 Exercises

9. What is the constant slope of the function $w(x) = 12$? Verify this by using Definition 3.3.1 to find the formula for the function $w'(x)$. Show **each** algebraic step. [Note: There are two parts to this problem. Answer the question **FIRST**, then use the definition to verify.]

A parabolic function is shown in Figure 4.2.1. Each question in this problem is in reference to that function.

- Several values of the function g' are given in Table 22.1. For **EACH** given value **use a straight-edge and colored pencils** to draw a **nice long line segment** at the corresponding point on g whose slope is equal to the value of g' . If we think of these line segments as actual lines, what do we call the lines?
- Use symmetry to complete Table 4.2.3.
- Plot the points from Table 4.2.3 onto Figure 4.2.2 and connect the dots. Determine the formula for the resultant linear function.
- The line you drew onto Figure 4.2.2 is **not** a tangent line to g . Just what exactly is this line?

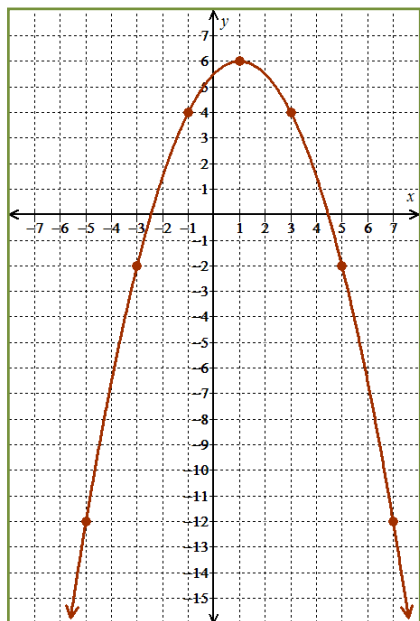


Figure 4.2.1: g
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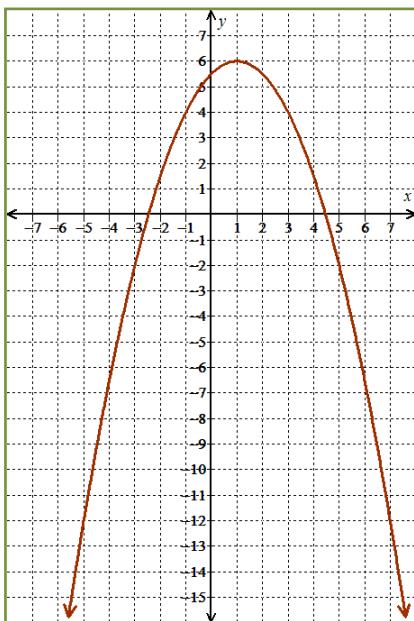


Figure 4.2.2: g

Table 4.2.3: $y = g'(x)$

x	y
-5	6
-3	
-1	2
1	
3	-2
5	-4
7	