Calculus Section 2.2 Basic Differentiation Rules

-Find the derivative of a function using the constant rule
-Find the derivative of a function using the power rule
-Find the derivative of the sine and cosine functions.

Homework: Page 114 #’s 3-22, 31, 40, 57, 61, 63

You do not have to use the limit definition of the derivative to find the derivative of a function because there is a shortcut.

**Derivative Constant Rule and Power Rule**The derivative of a **constant number** is \_\_\_\_\_\_\_\_\_\_\_\_. This is because the graph of a constant is a horizontal line. Therefore, the slope of a constant must be zero.

The derivative of a function with **x raised to a power** is 

Examples)
1)  2)  3) $f\left(x\right)=\sqrt[3]{x^{2}}$

**The Constant Multiple Rule**If *f* is a differentiable function and *c* is a real number, then *cf* is also differentiable:

 then 

Examples)
1)  2)  3) $f\left(x\right)=3\sqrt[5]{x^{3}}$

**Sum and Difference Rule**If both *f* and *g* are differentiable, then the sum or difference of *f* and *g* is differentiable as well.

  then 

Examples)
1)  2) 

**Derivative of Sine and Cosine Functions**

 

Examples)
1)  2)  3) 

**Horizontal Tangent Line**Horizontal tangent lines have many applications in calculus. You can find where a function has a horizontal tangent line

by taking the derivative of the function and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

For what values of x do the following functions have a horizontal tangent line?

1) f(x) = 3x2 – 2x + 1 2) f(x) = -cos(x)