Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2.3: The Product, Reciprocal and Quotient Rules

Activity 1:

Part 1: For each of the following scenarios, draw a diagram to visualize how to find the new y value:

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| 1. Initial point $(2,4)$, slope = 3, find the value of $y$ when $x=7$.
 | 1. Initial point $(3,-1)$, slope = $-2$, find the value of $y$ when $x=5$.
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| 1. Initial point $(1,2)$, slope = 5, find the value of $y$ when $x=4$.
 | 1. Initial point $(-2,7)$, slope = $-3$, find the value of $y$ when $x=0$.
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Part 2: Generalize these examples to raw a diagram to make sense of the general formula

$$y\_{final}=y\_{init}+m\*∆x$$

Activity 2

Part 1. Given $f(x)=2+x^{2}$ and initial point $(1,3)$: Without finding the formula of the tangent line, use the formula for linear approximations$y\_{final}=y\_{init}+m\*∆x$ to approximate the following using the tangent line at $x=1$*:*

1. $f(2)$
2. $f(1.1)$
3. $f(1.01)$
4. $f(1+h)$

Part 2: Generalize these examples to draw a diagram showing $y= f(x)$and a linear approximation $y=L(x)$ to make sense of the general formula $f\left(x+h\right)≈f\left(x\right)+h\*f'(x)$ and indicate when this linear approximation will become precise.

Activity 3: Use the approximation $f\left(x+h\right)≈f\left(x\right)+h\*f'(x)$ and the algebraic definition of the derivative to develop a rule for the derivative of the product of two functions: $\frac{d}{dx}(f\left(x\right)\*g\left(x\right))$

Activity 4: Use the approximation $f\left(x+h\right)≈f\left(x\right)+h\*f'(x)$ and the algebraic definition of the derivative to develop a rule for the derivative of the reciprocal of a function: $\frac{d}{dx}(\frac{1}{f(x)})$

Activity 5: Use the product and reciprocal rules to develop the quotient rule: $\frac{d}{dx}(\frac{f(x)}{g(x)})$

Activity 6: Practice applying these rules with the online assignment in canvas.