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

Section 2.1 – Part 1

Power Functions, derivatives when adding 2 functions, multiplying a function by a constant

1. On a separate sheet of paper, use the algebraic definition of a derivative (forward difference quotient) to demonstrate that the power rule $\frac{d}{dx}(x^{n})=nx^{n-1}$is true when
	1. $n=1$
	2. $n=2$
	3. $n=3$
	4. $n=-1$
	5. $n=\frac{1}{2}$
	6. $n=-2$
	7. $n=-\frac{1}{2}$
2. Given that $f\left(x\right)=2x$ and $g\left(x\right)=3x$:
	1. Use your knowledge of derivatives to fill in the following table:

|  |  |  |  |
| --- | --- | --- | --- |
| *h(x)* | $$\frac{d}{dx}(f\left(x\right))$$ | $$\frac{d}{dx}(g\left(x\right))$$ | $$\frac{d}{dx}(h\left(x\right))$$ |
| $$h\left(x\right)=f\left(x\right)+g\left(x\right)$$ |  |  |  |
| $$h\left(x\right)=f\left(x\right)-g\left(x\right)$$ |  |  |  |
| $$h\left(x\right)=3\*f\left(x\right)$$ |  |  |  |
| $$h\left(x\right)=-2\*g\left(x\right)$$ |  |  |  |

* 1. What would this table suggest about the following derivatives
		1. $\frac{d}{dx}(f\left(x\right)+g(x))$
		2. $\frac{d}{dx}(f\left(x\right)-g(x))$
		3. $\frac{d}{dx}(k\*f\left(x\right))$
		4. $\frac{d}{dx}(k\*g\left(x\right))$
1. Given that $f\left(x\right)=x^{2}$ and $g\left(x\right)=4x$:
	1. Use your knowledge of derivatives to fill in the first two columns of the following table:

|  |  |  |  |
| --- | --- | --- | --- |
| *h(x)* | $$\frac{d}{dx}(f\left(1\right))$$ | $$\frac{d}{dx}(g\left(1\right))$$ | $$\frac{d}{dx}(h\left(1\right))$$ |
| $$h\left(x\right)=f\left(x\right)+g\left(x\right)$$ |  |  |  |
| $$h\left(x\right)=f\left(x\right)-g\left(x\right)$$ |  |  |  |
| $$h\left(x\right)=2\*f\left(x\right)$$ |  |  |  |
| $$h\left(x\right)=-3\*g\left(x\right)$$ |  |  |  |

* 1. What would this table suggest about the following derivatives
		1. $\frac{d}{dx}(f\left(x\right)+g(x))$
		2. $\frac{d}{dx}(f\left(x\right)-g(x))$
		3. $\frac{d}{dx}(k\*f\left(x\right))$
		4. $\frac{d}{dx}(k\*g\left(x\right))$
1. Based on the previous two problems, write down rules for the following and describe a situation (include the unites of *x, f(x) and g(x) )* to make sense of them (money, position, etc. are fine)
	* 1. $\frac{d}{dx}(f\left(x\right)+g(x))$
		2. $\frac{d}{dx}(f\left(x\right)-g(x))$
		3. $\frac{d}{dx}(k\*f\left(x\right))$
		4. $\frac{d}{dx}(k\*g\left(x\right))$
2. Complete the associated online assignment on power functions to practice the mechanics of taking derivatives.