Section 1.5 – More on Derivatives Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. A function *f* is represented by the following table.
	1. Fill in the missing cells with the best possible approximation.
	2. What are the units of *f’(x)?*
	3. Describe a situation that could accompany this table.
	4. If *f’(a) = 0*, what is the best guess for *a?*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *x=days* | 0 | 2 | 4 | 6 |
| *f(x)=height of water (meters)* | 4 | 6 | 6 | 4 |
| *f’(x)* |  |  |  |  |

1. The function *f* is represented by the following graph*.*

|  |  |
| --- | --- |
|  | Draw the tangent line to *f* at *x = 0* and use it to approximate *f’(0)*. $f'(0)≈\\_\\_\\_\\_\\_\\_$If ***h =* 1**, for each of the following difference quotients, draw the line and approximate *f’(0)*1. Forward difference quotient or average slope on [0,0+h]

 $f'(0)≈\\_\\_\\_\\_\\_\\_$1. Backward difference quotient

Or average slope on [0-h,0] $f'(0)≈\\_\\_\\_\\_\\_\\_$1. Centered difference quotient

or average slope on [0-h,0+h] $f'(0)≈\\_\\_\\_\\_\\_\\_$Which approximation is closest to the actual value of *f’(0)* |

1. Given that $y=fIx)=2x^{2}$,
	1. Calculate *f’(x)* using the algebraic definition with the backward difference quotient, the forward difference quotient and the centered difference quotient.
	2. Verify that they all give the same answer
	3. Why would these calculations suggest that the central difference quotient works best?
2. A function *f* is represented by the following table.
	1. Fill in the missing cells with the best possible approximation.
	2. What are the units of *f’(x)?*
	3. What does *f’* tell us about the situation*?*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *x = weeks since Jan 1* | 0 | 1 | 2 | 3 |
| *f(x) =current Hospitalizations due to Covid* | 600 | 1000 | 1200 | 1300 |
| *f’(x)* |  |  |  |  |

1. The function *f* is represented by the following graph*.*



Draw the tangent line to *f* at *x = 0.5* and use it to approximate *f’(0)*.

 $f'(0.5)≈\\_\\_\\_\\_\\_\\_$

If ***h = 0.5***, for each of the following difference quotients, draw the line and approximate *f’(0)*

1. Forward difference quotient or average slope on [0.5,0.5+h]

 $f'(0.5)≈\\_\\_\\_\\_\\_\\_$

1. Backward difference quotient or average slope on [0.5-h,0.5]

 $f'(0.5)≈\\_\\_\\_\\_\\_\\_$

1. Centered difference quotient or average slope on [0.5-h,0.5+h]

 $f'(0.5)≈\\_\\_\\_\\_\\_\\_$

Which approximation is closest to the actual value of *f’(0)*

1. Given that $y=fIx)=x^{3}$,
	1. Calculate *f’(x)* using the algebraic definition with the backward difference quotient, the forward difference quotient and the centered difference quotient.
	2. Verify that they all give the same answer
	3. Why would these calculations suggest that the central difference quotient works best?