**2.3: Tangent Slopes and Graph Characteristics**

*Homework: pg 86 #4, 5,7*

1. Using the graphs below, estimate the instantaneous rates of change (mT) for each of the graphs at the given points.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| T | 0 | .25 | .5 | .8 | 1 | 1.5 | 1.8 |
| *Mt* |  |  |  |  |  |  |  |



|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| t | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| *Mt* |  |  |  |  |  |  |  |  |

2 a) Describe the graphical features (e.g., local maximum/minimum point, interval of increase/decrease), mT values (e.g., +, -, 0), and, where appropriate, the trend of the slope of the tangent (e.g., changing from positive to zero to negative) as time increases.

|  |  |  |  |
| --- | --- | --- | --- |
| **Interval** | **Graphical feature**(local max/min point, interval of increase, interval of decrease) | **mT values**(+, - , 0) | **mT trend (if appropriate)**(changing from positive to zero to negativeorchanging from negative to zero to positive) |
| **Graph A: Domain 0-0.8** |  |  |  |
| **Graph A: at 0.8** |  |  |  |
| **Graph A: Domain 0.8-1.75** |  |  |  |
| **Graph B: Domain 0-3** |  |  |  |
| **Graph B: at 3** |  |  |  |
| **Graph B: Domain 3-5** |  |  |  |
| **Graph B: at 5** |  |  |  |
| **Graph B: Domain 5-7** |  |  |  |

b) Describe the context where the slope of the tangent is zero. What does it mean?

3. The **slope of the secant line can be a good estimate of the slope of the tangent.** Ali thought that using an interval of 1 second to determine the slope of the secant line in graph A is good enough to estimate the slope of the tangent. **Do you agree or disagree? Justify your reasoning.**

4. For Graph A, state the slope of the tangent at 0.5 and 1 second. At which point is the shot put going faster? Explain.

5. Rita says that a tangent crosses a curve in one and only one point. Do you agree or disagree? Use Graph B to justify your position.

**Example:** Finding the instantaneous rate of change using the DIFFERENCE QUOTIENT

$m\_{t}=\frac{f\left(a+h\right)- f(a)}{h}$, as $h\rightarrow 0$

Consider the functions

* $f\left(x\right)= -2(x-4)^{2}+6$, find the instantaneous rate of change at x=2
* $f\left(x\right)= \frac{1}{2x+6} $, find instantaneous rate of change at x = 1
* $f\left(x\right)= \sqrt{x-3} $, find instantaneous rate of change at x = 5