**Guide Worksheet: Intro to The Derivative**  Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. This function gives the height of an object, in feet, as a function of time t, in sec.

$$h\left(t\right)=12t-t^{2}$$

1. Make a precise sketch, along with a table of values for height exactly 2 sec. after launch, 4 sec. , and 6 sec. Graph paper available, if you need. When does it reach maximum height? What is the maximum height? Indicate on graph.
2. How is the vertical velocity of the object changing as time progresses from t=0 to t= 6? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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What is the velocity of the object at the instant 3 sec. elapse? How can you graphically JUSTIFY your answers to each of these two questions?

1. Can you superimpose lines on this graph whose slopes indicate velocity ? (see warm-up where the slope of the linear function indicated the rate of change of the quantity of interest….)
2. Suppose a demand function is given by

$$p\left(x\right)=12-x$$

1. Verify this is a valid demand function by checking unit price and quantity demanded for at least two points.
2. Construct the revenue function for this economic model. Make a precise sketch of this function with a table of values at production levels 2 units, 4 units and 6 units. Graph paper available, if you need. When is maximum revenue achieved? Indicate on graph.
3. Does the rate of change of revenue (per unit of production) change as production level increases from 0 to 6 units? (i.e. when does it appear that revenue is increasing most quickly?) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

How quickly is revenue increasing per unit of production when production level is 3 units? How can you graphically JUSTIFY your answers to each of these two questions?

1. Can you superimpose lines on this graph whose slope indicate rates of change of revenue? (see warm-up where the slope of the linear function indicated the rate of change of the quantity of interest….)
2. Compare applications # 1 and #2. Comments?