$\qquad$

1. Let $f(x)=-4 x+5$.
a. What is the slope of the line $f(x)$ ?
b. Find the derivative equation for $f(x)$.
c. How do your answers to (a) and (b) compare? Why?
2. A graph for the function $f(x)=-x^{2}+8 x-12$ is shown.
a. Where is the slope of $f(x)$ equal to 0 ?
b. Find the derivative equation for $f(x)$, denoted $f^{\prime}(x)$.

c. Find where the derivative equation you obtained in part (b) equals 0 . How does it compare to your answer to part (a)? Explain.
d. Find $f^{\prime}(2)$ and explain why the value is what it is.
e. Find $f^{\prime}(5)$ and explain why the value is what it is.
3. Sketch a graph of $f(x)$ for each situation that satisfies the statement about its derivative, $f^{\prime}(x)$.

| $f^{\prime}(x)=0$ always | $f^{\prime}(x)>0$ always |
| :--- | :--- |
| $f^{\prime}(x)<0$ always and $f^{\prime}(x)$ is not constant | $f^{\prime}(x)<0$ for $x<2$ and $f^{\prime}(x)>0$ for $x>2$ |
|  |  |

4. The graph for $f(x)=\sin x$ is shown.
a. Go to tinyurl.com/graph123321 and use the Desmos applet to determine what the slope of $f(x)=\sin x$ is at each point given in the table and record your value in the table.

| $x$ | slope |
| :---: | :---: |
| 0 |  |
| $\frac{\pi}{2}$ |  |
| $\pi$ |  |
| $\frac{3 \pi}{2}$ |  |
| $2 \pi$ |  |
| $\frac{5 \pi}{2}$ |  |
| $3 \pi$ |  |
| $\frac{7 \pi}{2}$ |  |
| $4 \pi$ |  |



b. Plot the points from the table on the blank graph above, letting the slope value be the $y$ coordinate of the point. So, for example, the first point you would plot should be $(0,1)$.
c. Sketch in what the graph for the derivative function (slope function) for $f(x)=\sin x$ will be. What function is it? Is that surprising to you?

