

Topic Quiz #4: Derivatives

Version #3

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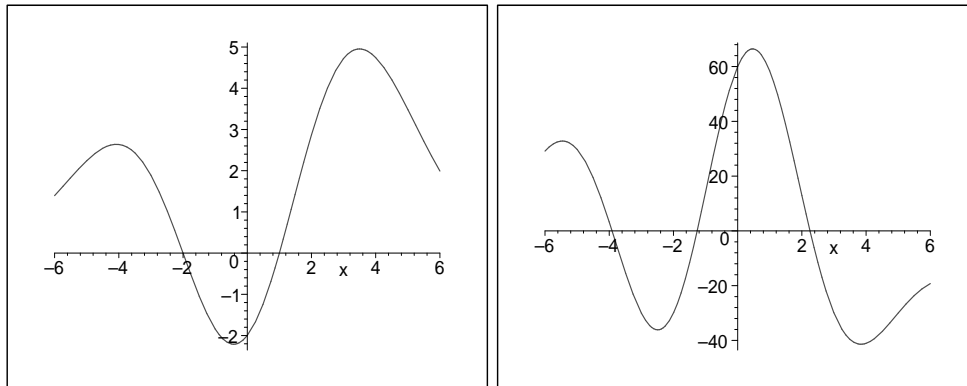


Figure 1: Graph 1 is $f(x)$. Graph 2 is $g'(x)$.

At Point A, the value of $f'(x)$ is _____, since $f(x)$ is _____.
 At Point B, the value of $f''(x)$ is _____, since $f(x)$ is _____.
 Point C is a _____, since the value of $f'(x)$ is _____ and the
 value of $f''(x)$ is _____. Point D is a _____, since the value
 of _____ is _____.

Here are some hints at answering these problems.

First, look at the point in question and come up with your own statements about the point. For Point A, the function is positive, increasing, and concave down; the last two facts tell you that $f'(x)$ is positive and $f''(x)$ is negative. Look at your chart if you did not realize this. Then read the sentence on the quiz and fill in the blanks using the statements that you know are true.

When given the graph of the original function, you can come up with three statements concerning the location of the points, whether the function is increasing or decreasing, and the concavity of the function. The statement about whether the function is increasing or decreasing is equivalent to a statement that can be made about the first derivative. The statement about the concavity of a function is equivalent to a statement that can be made about the second derivative.

There are a handful of statements that can be made about each point, but the key words in each of the questions should determine which terms complete the sentence that is true. For example, we know at Point A that the function is concave down and hence, the second derivative is negative, but the question on the quiz did not ask about the second derivative. This was just additional information that you

never used. It did ask about the first derivative.

At Point N, the value of $g'(x)$ is _____ and the value of $g''(x)$ is _____, therefore the function $g(x)$ is _____ and concave _____. At Point O, the value of $g'(x)$ is _____ and the value of $g''(x)$ is _____, therefore this point is a _____ on the graph of $g(x)$. At Point P, the value of $g'(x)$ is _____ and $g''(x)$ is _____, therefore this point is a _____ on the graph of $g(x)$. At Point Q, the value of $g''(x)$ is _____, therefore this point is a _____ on the graph of $g(x)$. At Point R, the value of $g'(x)$ is _____, therefore the function $g(x)$ is _____. At Point S, the value of $g''(x)$ is _____, therefore the function $g(x)$ is _____.

These statements were using the graph of $g'(x)$. Again, my suggestion would be to understand what is happening according to the picture, then fill in the blanks.

For example, at Point N, the function $g'(x)$ is positive and decreasing. Now formulate the conclusions; the chart that we covered in class should help. For example, at Point N, $g(x)$ is increasing (because you know $g'(x) > 0$) and $g''(x)$ is negative (remember that a function's derivative is negative where the function is decreasing; in this case we are talking about $g'(x)$ decreasing, so $g''(x)$ is negative); if $g''(x) < 0$, then $g(x)$ is concave down.