

Differentiation

/28

***** NO CALCULATORS - Except #6 *******Show all work logically to receive full marks!**

1.

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
5	13	-10	7	-5
6	5	8	-8	15

Use the table of function values given above to answer the following. Simplify your answers completely.

a. If $H(x) = 5g(x) - \frac{7f(x)}{g(x)}$ determine $H'(5)$. [2]

b. If $H(x) = f[f(x)]$ determine $H'(6)$. [2]

c. If $g[f(x)] = x$ determine $f'(8)$. [3]

2. Determine $\frac{d}{dx} \cot^3(x^2)$ [3]

3. A curve is defined implicitly as $x^2y - 3y + xy^2 = 8$. Determine the equation of the line that is tangent to the curve at the point $P(1, 4)$. [4]

4. Determine the coordinates of the point(s) on the graph of $f(x) = x^3 - 2$ where the slope is 3. [3]

5. The position of an object is given by $s(t) = 3t^2 - 2t - 5$.

a. Determine at what time the object is at rest. [2]

b. At $t = 0.1$, is the object speeding up or slowing down? Explain your answer. [3]

d. Determine the average velocity of the object over $t = [1, 5]$. [2]

6. The function $f(x)$ is the inverse of function $g(x)$. If $f(x) = 3x^3 - 2x^2 + 5$, determine $g(21)$ and $g'(21)$. [4]
(You may use your GC for this question).