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QUIZ 6

MATH 200, SECTION 9

March 5, 2021

Directions: Closed book, closed notes, no calculators.

By submitting this quiz you affirm that you agree with this statement: *On my honor, I have neither given nor received unauthorized aid on this assignment, and I pledge that I am in compliance with the VCU Honor System.*

1. $\frac{d}{dx}\left[\frac{x^3+7x-3}{e^x}\right] =$ $\frac{(3x^2+7)e^x - (x^3+7x-3)e^x}{(e^x)^2}$

$= \frac{e^x(3x^2+7-x^3-7x+3)}{e^x e^x} = \boxed{\frac{3x^2-x^3-7x+10}{e^x}}$

2. Find all x for which the tangent line to $y = f(x) = \frac{1}{3}x^3 - \frac{3}{2}x^2 + 2x$ at $(x, f(x))$ is horizontal.

Solve $f'(x) = 0$

$\frac{1}{3}3x^2 - \frac{3}{2}2x + 2 = 0$

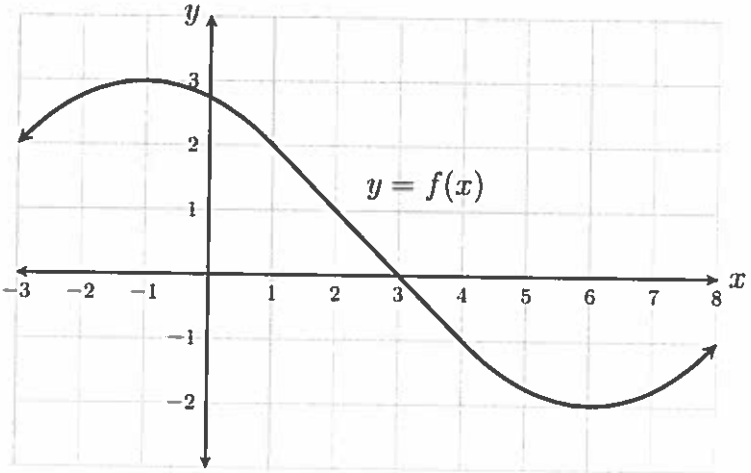
$x^2 - 3x + 2 = 0$

$(x-1)(x-2) = 0$

→ Solutions: $x = 1$, $x = 2$.

Tangent line has slope 0 at $x = 1$ and $x = 2$

3. Answer the question involving the function $f(x)$ whose graph is sketched below.



(a) State all x for which $f'(x) = 0$.

$\boxed{x = -1 \text{ and } x = 6}$

(b) Let $g(x) = f(x) \cdot f(x)$. Find $g'(2)$.

$g'(x) = f'(x)f(x) + f(x)f'(x)$

$= 2f(x)f'(x)$

$g'(2) = 2f(2)f'(2)$

$= 2 \cdot 1 \cdot (-1) = \boxed{-2}$

(c) Let $h(x) = \frac{f(x)}{x}$. Find $h'(6)$. $h'(x) = \frac{f'(x)x - f(x)\cdot 1}{x^2}$

Thus $h'(6) = \frac{f'(6)\cdot 6 - f(6)\cdot 1}{6^2} = \frac{0\cdot 6 - (-2)\cdot 1}{36} = \boxed{\frac{1}{18}}$