

Math 131 - Quiz 3
September 29, 2021

Name key _____
Score _____

Show all work to receive full credit. Supply explanations when necessary. This quiz is due October 6.

1. (6 points) Find the derivative of each function. Do not simplify.

(a) $g(x) = 4x^5 - 17x^2 + 9x - 8$

$$g'(x) = 20x^4 - 34x + 9$$

(b) $f(t) = t^{2/3} \cos t$

PRODUCT
RULE

$$f'(t) = \frac{2}{3}t^{-1/3} \cos t - t^{2/3} \sin t$$

(c) $y = \frac{x^2 + 4x}{\tan x}$

QUOTIENT
RULE

$$\frac{dy}{dx} = \frac{(2x+4)(\tan x) - (x^2+4x)\sec^2 x}{\tan^2 x}$$

(d) $r = \theta + \frac{1}{\theta} + \frac{1}{\theta^2} = \theta + \theta^{-1} + \theta^{-2}$

$$\frac{dr}{d\theta} = 1 - \theta^{-2} - 2\theta^{-3} = 1 - \frac{1}{\theta^2} - \frac{2}{\theta^3}$$

Turn over.

2. (2 points) Find an equation of the line tangent to the graph of $y = x^2 + x + \sqrt{x}$ at the point where $x = 1$. Write your final answer in slope-intercept form.

$$\frac{dy}{dx} = 2x + 1 + \frac{1}{2}x^{-1/2}$$

$$m = \left. \frac{dy}{dx} \right|_{x=1} = 2 + 1 + \frac{1}{2} = 3.5$$

POINT: $x = 1, y = 3$

$(1, 3)$

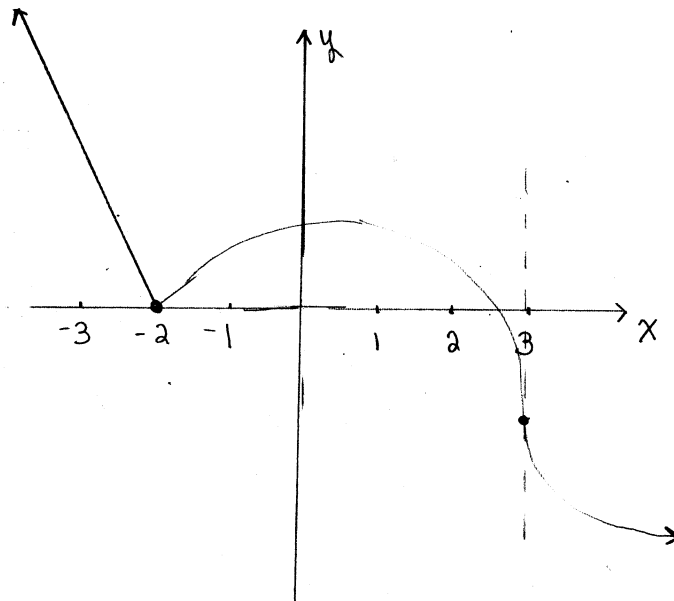
TANGENT LINE:

$$y - 3 = 3.5(x - 1)$$

OR

$$y = 3.5x - 0.5$$

3. (2 points) Sketch the graph of a continuous function that is not differentiable at $x = -2$ and $x = 3$.



SHARP PT AT $x = -2$
VERTICAL TAN. LINE
AT $x = 3$