

PreCalculus '13-14
Dr. Quattrin
Spring Final-- CALCULATOR ALLOWED
Round to 3 decimal places.
Show all work.

Name: SOLUTION KEY

Score _____

1. Find the zeros and Domain of $y = 2x^3 + x^2 - 4x + 8$ on $x \in [0, 7]$. Show the supporting algebraic work.

$$\text{Domain } x \in [0, 7]$$

$$\text{Zeros: } (-2, 216, 0) \text{ BUT THIS IS NOT IN THE DOMAIN}$$

SO NONE

2. Find the critical values and extreme values of $y = 2x^3 + x^2 - 4x + 8$ on $x \in [0, 7]$. Show the derivative and algebra to support the critical values.

$$i) \frac{dy}{dx} = 6x^2 + 2x - 4 = 0$$

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

$$(3x - 2)(x + 1) = 0$$

$$x = 2/3, -1$$

$$y(-1) = \text{NOT IN DOMAIN}$$

$$y(2/3) = 6.370$$

$$y(0) = 8$$

$$y(7) = 715$$

$$ii) \frac{dy}{dx} \text{ DNE}$$

$$iii) \text{ ENDPOINTS } \rightarrow x = 0, 7$$

3. Find the traits and sketch $y = 2x^3 + x^2 - 4x + 8$ on $x \in [0, 7]$.

Domain: $x \in [0, 7)$

Range: $x \in [6.370, 715]$

Y-Int: $(0, 8)$

EB Left: NONE

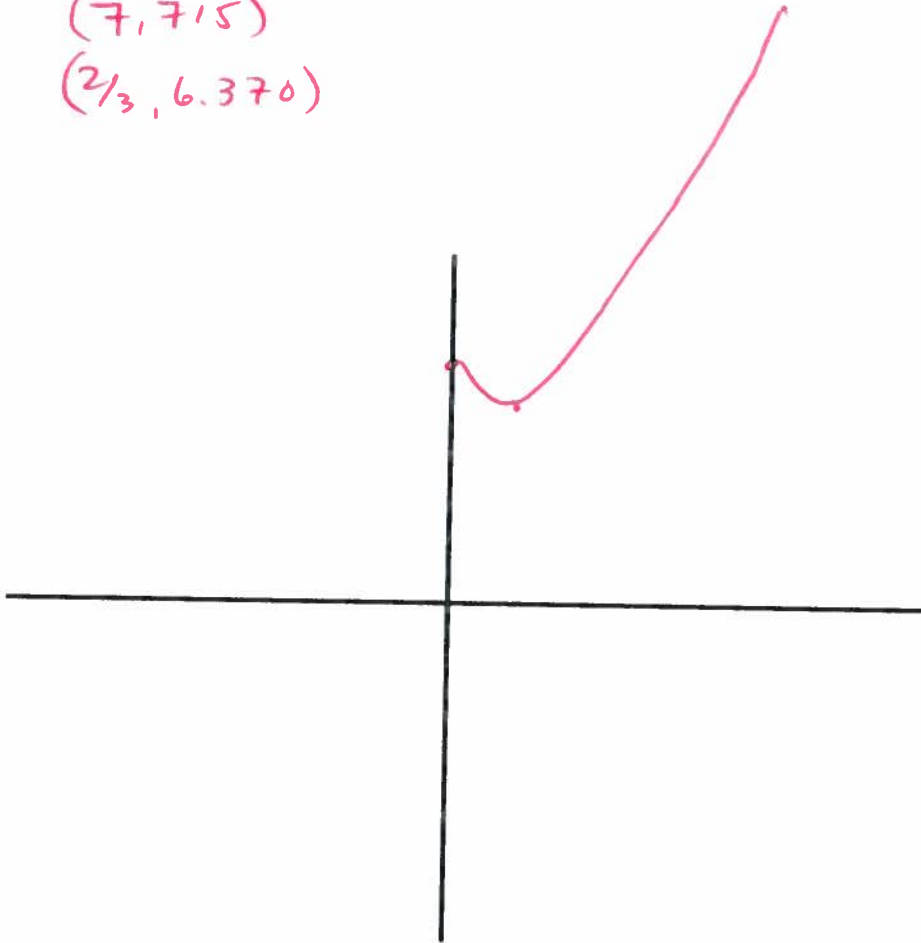
Zeros: NONE

EB Right: NONE

Extreme Points: $(0, 8)$

$(7, 715)$

$(2/3, 6.370)$



4. Find the zeros and Domain of $y = (x^2 - 3x)e^{2x}$. Show the supporting algebraic work.

Domain: $x \in \text{All Reals}$

Zeros: $x^2 - 3x = 0 \rightarrow x = 0, 3$

5. Find the critical values and extreme values of $y = (x^2 - 3x)e^{2x}$. Show the derivative and algebra to support the critical values.

$$\begin{aligned}\frac{dy}{dx} &= (x^2 - 3x)e^{2x}(2) + e^{2x}(2x - 3) \\ &= e^{2x}(2x^2 - 6x + 2x - 3) = 0\end{aligned}$$

$$2x^2 - 4x - 3 = 0$$

$$x = \frac{4 \pm \sqrt{16 + 24}}{4} = \begin{cases} \cancel{2.581} & 2.581 \\ -0.581 \end{cases}$$

$$y(-0.581) = .651$$

$$y(2.581) = -188.725$$

6. Find the traits and sketch $y = (x^2 - 3x)e^{2x}$.

Domain: All Reals

Range: $y \in [-188.725, \infty)$

Y-Int: $(0, 0)$

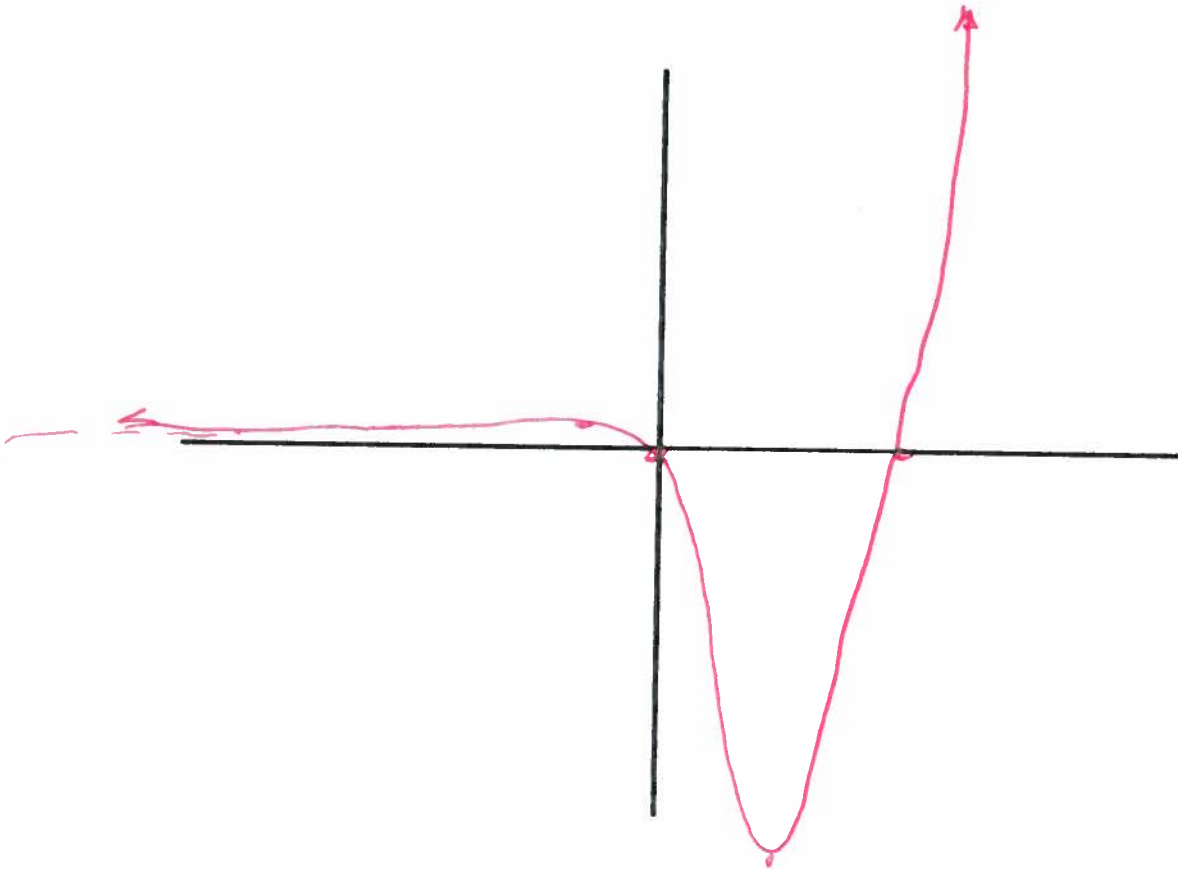
EB Left: $y = 0$

Zeros: $(0, 0)$ $(3, 0)$

EB Right: UP

Extreme Points: $(-1.581, .651)$

$(2.581, -188.725)$



7. Find the zeros, VAs, and POEs of $y = \frac{1-x^2}{x^2+4}$. Show the supporting algebraic work.

$$\begin{array}{l} \text{Zeros } (\pm 1, 0) \\ \text{VAs: NONE} \\ \text{POES: NONE} \end{array} \left. \vphantom{\begin{array}{l} \text{Zeros } (\pm 1, 0) \\ \text{VAs: NONE} \\ \text{POES: NONE} \end{array}} \right\} \text{DENOM} \neq 0$$

8. Find the critical values and extreme values of $y = \frac{1-x^2}{x^2+4}$. Show the derivative and algebra to support the critical values.

$$\frac{dy}{dx} = \frac{(x^2+4)(-2x) - (1-x^2)(2x)}{(x^2+4)^2} = \frac{2x(5)}{(x^2+4)^2}$$

$$i) \frac{dy}{dx} = 0 \rightarrow x=0. \rightarrow y = \frac{1}{4}$$

$$ii) \frac{dy}{dx} \text{ DNE} \rightarrow \text{NONE}$$

$$iii) \text{ ENDPOINTS: NONE}$$

9. Find the traits and sketch of $y = \frac{1-x^2}{x^2+4}$.

Domain: \mathbb{R}

Y-Int: $(0, -1/4)$

Zeros: $(\pm 1, 0)$

Range: $y \in (-1, 1/4]$

VAs: NONE

EB Left: $y = -1$

Extreme Points: $(0, 1/4)$

EB Right: $y = -1$

