

PreCalculus '13-14

Name: SOLUTION KEY

Dr. Quattrin

Practice Sp Final-- CALCULATOR ALLOWED

Round to 3 decimal places.

Score \_\_\_\_\_

Show all work.

1. Find the zeros and Domain of  $f(x) = \frac{1}{2}x^4 - 2x^3 - 9x^2 + 1$ . Show the supporting algebraic work.

$$(.323, 0)$$

$$(-.348, 0)$$

$$(-2.66, 0)$$

$$(6.682, 0)$$

Domain  $x \in \text{ALL REALS}$

2. Find the critical values and extreme values of  $f(x) = \frac{1}{2}x^4 - 2x^3 - 9x^2 + 1$ . Show the derivative and algebra to support the critical values.

$$\frac{dy}{dx} = 2x^3 - 6x^2 - 18x = 0$$

$$2x(x^2 - 3x - 9) = 0$$

$$x = 0 \quad x = \frac{3 \pm \sqrt{9 + 36}}{2} = \begin{cases} 4.854 \\ -1.854 \end{cases}$$

$$y(0) = 1$$

$$y(4.854) = -162.218$$

$$y(-1.854) = -11.282$$

3. Find the traits and sketch  $f(x) = \frac{1}{2}x^4 - 2x^3 - 9x^2 + 1$ .

Domain: ALL REALS

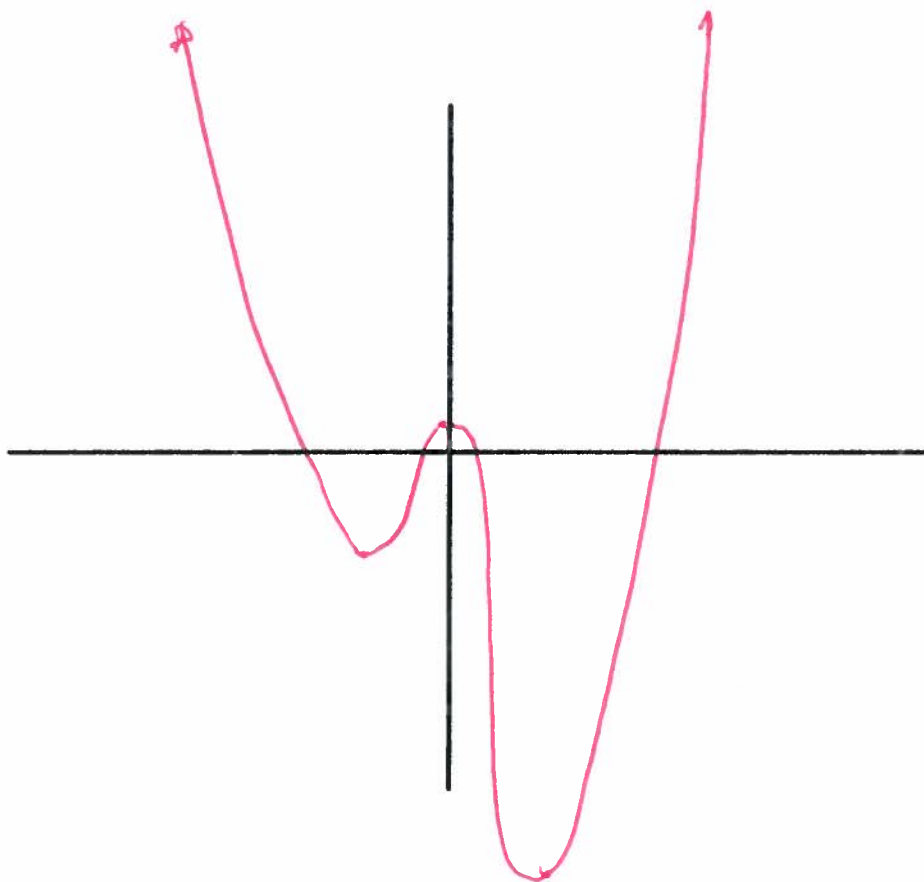
Range:  $y \in [-162, 218, \infty)$

Y-Int:  $(0, 1)$

End Behavior:  $\nearrow \nearrow$

Zeros: 5 2 2 #1

Extreme Points:  $(0, 1)$   $(4.854, -162)$   
 $(-1.854, -11.283)$



4. Find the zeros and Domain of  $y = 9(x^2 - x)e^{2x}$ . Show the supporting algebraic work.

Domain:  $x \in \text{ALL REALS}$

Zeros:  $x^2 - x = 0 \rightarrow x = 0, 1$

$(0, 0)$  ..  $(1, 0)$

~~$(1, 0)$~~

5. Find the critical values and extreme values of  $y = 9(x^2 - x)e^{2x}$ . Show the derivative and algebra to support the critical values.

$$\frac{dy}{dx} = 9(x^2 - x)e^{2x}(2) + 9e^{2x}(2x - 1)$$

$$= 9e^{2x} [2x^2 - 2x + 2x - 1]$$

$$= 9e^{2x} [2x^2 - 1] = 0$$

$$x = \pm \frac{1}{\sqrt{2}}$$

6. Find the traits and sketch  $y = 9(x^2 - x)e^{2x}$ .

Domain: ALL REALS

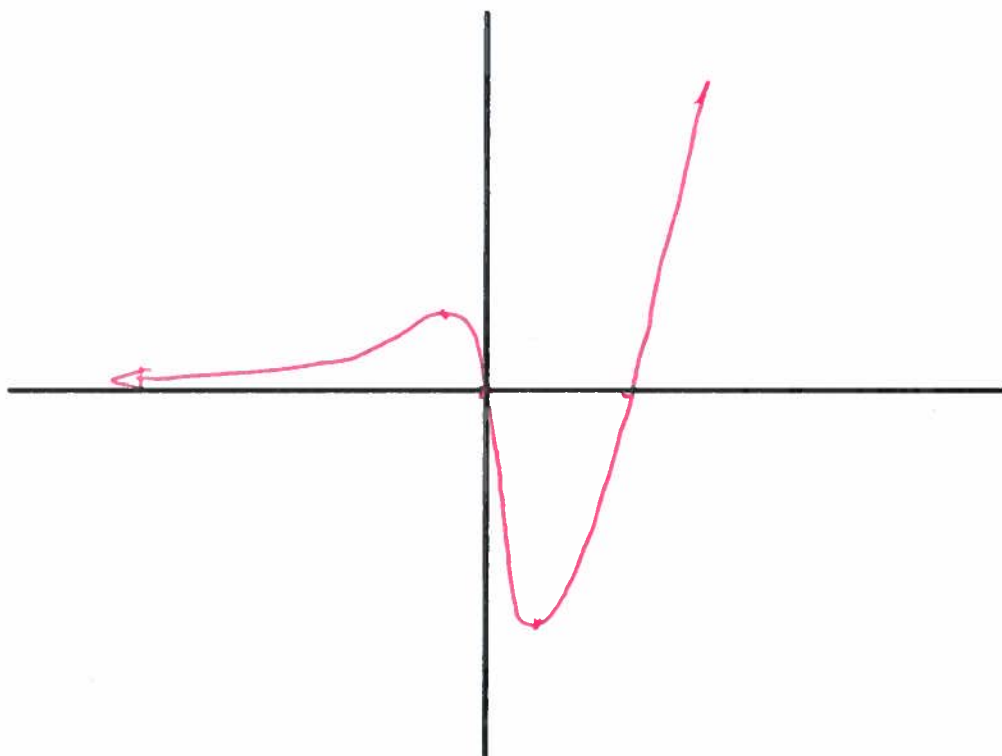
Range:  $y \in [-7.667, \infty)$

Y-Int:  $(0, 0)$

End Behavior: LEFT:  $y \rightarrow 0$   
RIGHT: UP

Zeros:  $(0, 0)$   $(1, 0)$

Extreme Points:  $(\frac{1}{2}, -7.667)$   
 $(-\frac{1}{2}, 2.641)$



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

DOMAIN

DOMAIN  $x \neq \pm 2$

ZEROS:  $(0, 0)$

VA:  $x = \pm 2$

POE: NONE

$$\frac{-4x^2}{(x-2)(x+2)}$$

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

$$\frac{dy}{dx} = \frac{(x^2-4)(-8x) - (-4x^2)(2x)}{(x^2-4)^2} = \frac{-8x^3 + 32x + 8x^3}{(x^2-4)^2}$$

$$= \frac{32x}{(x^2-4)^2}$$

i)  $\frac{dy}{dx} = 0 \rightarrow x = 0$

ii)  $\frac{dy}{dx} = DNE \rightarrow x = \pm 2$  BUT  $\pm 2$  ARE NOT IN THE DOMAIN

$\therefore \boxed{x=0}$

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

Domain:  $x \neq \pm 2$

Y-Int:  $(0, 0)$

Zeros:  $(0, 0)$

Range:  $y \in \left[ \frac{0}{1} + (-\infty, -4) \cup [0, \infty) \right)$

VAs:  $x = \pm 2$

End Behavior:  $y = -4$

Extreme Points:  $(0, 0)$

