

PreCalculus '13-14

Name: SOLUTION KEY

Dr. Quattrin

Polynomials Test-- CALCULATOR ALLOWED

Round to 3 decimal places.

Score _____

Show all work.

1. Find the zeros and VAs of $y = \frac{2x^3 + x^2 - 8x - 4}{2x^3 + x^2 + 8x + 4}$. Show the

supporting algebraic work.

$$y = \frac{x^2(2x+1) - 4(2x+1)}{x^2(2x+1) + 4(2x+1)} = \frac{(x^2-4)(2x+1)}{(x^2+4)(2x+1)}$$

Zeros: $(\pm 2, 0)$

VA: NONE

POE $(-1/2, -15/17)$

2. Find the critical values and extreme values of $y = \frac{2x^3 + x^2 - 8x - 4}{2x^3 + x^2 + 8x + 4}$. Show the derivative and algebra to support the critical values.

$$\begin{aligned} \frac{d}{dx} \left(\frac{x^2-4}{x^2+4} \right) &= \frac{(x^2-4)(2x) - (x^2+4)(2x)}{(x^2+4)^2} \\ &= \frac{2x^3 - 8x - 2x^3 - 8x}{(x^2+4)^2} = \frac{-16x}{(x^2+4)^2} = 0 \\ &\quad (0, -1) \end{aligned}$$

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

$$= \frac{(3-x)(2) - \cancel{(2x-3)}(\cancel{-1})(1)}{(3-x)^2}$$

$$= \frac{6 - 2x - 2x + 3}{(3-x)^2}$$

$$= \frac{9 - 4x}{(3-x)^2}$$

4. Find the zeros, VAs, and POEs of $y = \frac{6x^2 + 18x}{x^3 + 3x^2 - 4x - 12}$. Show the supporting algebraic work.

$$y = \frac{6x(x+3)}{x^2(x+3) - 4(x+3)} = \frac{6x(x+3)}{(x^2-4)(x+3)}$$

Zeros (0, 0)

VAs: $x = \pm 2$

POE $\left(-3, -\frac{18}{5}\right)$

5. Find the critical values and extreme values of $y = \frac{6x^2 + 18x}{x^3 + 3x^2 - 4x - 12}$. Show the derivative and algebra to support the critical values.

$$\frac{dy}{dx} = \frac{d}{dx} \left(\frac{6x}{x^2-4} \right) = \frac{(x^2-4)(6) - 6x(2x)}{(x^2-4)^2}$$

$$= \frac{6x^2 - 24 - 12x^2}{(x^2-4)^2}$$

$$= \frac{-6x^2 + 24}{(x^2-4)^2} = 0$$

NO SOLUTION ∴

NO EXTREMES

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Polynomials Test—CALCULATOR NOT ALLOWED

Show all work.

Score _____

6. Write an equation of a rational function that has x -intercepts at $(-3, 0)$, VA at $x = 5$, a POE at $x = -2$, and a HA at $y = \frac{6}{5}$.

$$y = \frac{6(x+3)(x+2)}{5(x-5)(x+2)}$$

7. Find the traits and sketch $y = \frac{6x^2 + 18x}{x^3 + 3x^2 - 4x - 12}$.

Domain: $x \neq \pm 2, -3$

~~Range:~~ ALL REALS

Y -Int: $(0, 0)$

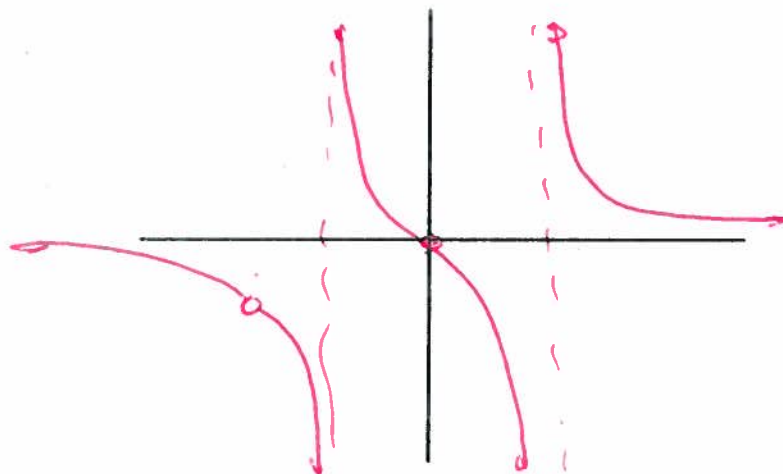
End Behavior: $y = 0$

Zeros: $(0, 0)$

Extreme Points: NO EXTREMES

POE $(-3, -\frac{18}{5})$

VA $x = \pm 2$



8. Find the traits and sketch of $y = \frac{2x^3 + x^2 - 8x - 4}{x^2 + 4}$ ~~$2x^3 + x^2 + 8x + 4$~~

Domain: ~~All x~~ $x \neq -1/2$

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

Zeros: $(\pm 2, 0)$

Range: $y \in [-1, 1)$

Vas: NONE

End Behavior: $y = 1$

POEs: ~~$(-1/2, -15/17)$~~

Extreme Points: $(0, -1)$

~~EB = SA~~

