PreCalculus Acc 17'-18' Name: Solution Key

Dr. Quattrin

Polynomial Test

CALCULATOR ALLOWED Score ___________

Round to 3 decimal places. Show all work.

1. Find the zeros of $y = 2x^3 + x^2 - 4x - 2$. Show the algebraic work to support the zeros.

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

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

$$x = \pm\sqrt{2},\ -1/2$$

$$(\pm\sqrt{2}, 0)\ (-1/2, 0)$$

2. Find the extreme points of $y = 2x^3 + x^2 - 4x - 2$. Show the derivative and algebra to support the critical values.

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

$$x = \frac{-2 \pm \sqrt{2^2 - 4(6)(-4)}}{2(6)} = \begin{cases} 2/3 \\ -1 \end{cases}$$

$$(-1, 1)$$

$$(2/3, -3.629)$$

3. Find the zeros of $y = -x^4 + 5x^2 - 4$. Show the algebraic work to support the zeros.

$$-(x^4 - 5x^2 + 4) = 0$$

$$-(x^2 - 4)(x^2 - 1) = 0$$

$$x = \pm 2, \pm 1$$

$$(\pm 2, 0) \quad (\pm 1, 0)$$

4. Find the extreme points of $y = -x^4 + 5x^2 - 4$. Show the derivative and algebra to support the critical values.

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$$\frac{dy}{dx} = -4x^3 + 10x = 0$$

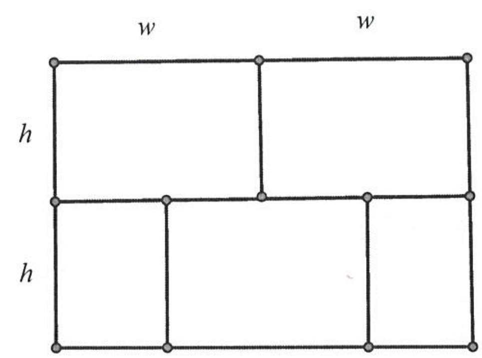
$$-2x(2x^2 - 5) = 0$$

$$x = 0, \pm\sqrt{2.5} \text{ or } \pm 1.581$$

OR

$$(0, -4), (\pm 1.581, 2.25)$$

5. 420 feet of fencing is used to partition a field as shown in the diagram below.



a. State the equation needed to maximize the area of the fielded.

$A = 2h(2w) = 4hw$

b. State the secondary equation needed to eliminate the extra variable.

$420 = 7h + 6w$

c. Eliminate the extra variable in the equation needed to minimize the amount of fencing.

$W = \frac{420 - 7h}{6}$

$A = 4h\left(\frac{420 - 7h}{6}\right) = 280h - \frac{14}{3}h^2$

or $h = 60 - \frac{6}{7}w$

$A = 4w\left(60 - \frac{6}{7}w\right)$

$= 240w - \frac{24}{7}w^2$

d. Find the maximum area of the field.

$\frac{dA}{dh} = 280 - \frac{28}{3}h = 0$

$30 = h$

$A = 4(30)\left(\frac{420 - 7(30)}{6}\right) = 4200$

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6. The sign pattern for the derivative of $H(x)$ is given. (a) Is $x=-3$ at a maximum, a minimum, or neither? Why? (b) Is $x=\frac{3}{4}$ at a maximum, a minimum, or neither? Why?

$H'(x)$	+	0	−	0	−	0	+
x		-3		$\frac{3}{4}$		5	

a) X=−3 IS AT A MAX, BECAUSE H' SWITCHES FROM + TO −

b) X= 3/4 IS NEITHER, BECAUSE THE SIGN OF H' DOES NOT CHANGE

7. Find the traits and **sketch** $y=2x^3+x^2-4x-2$.

Domain: ALL REALS

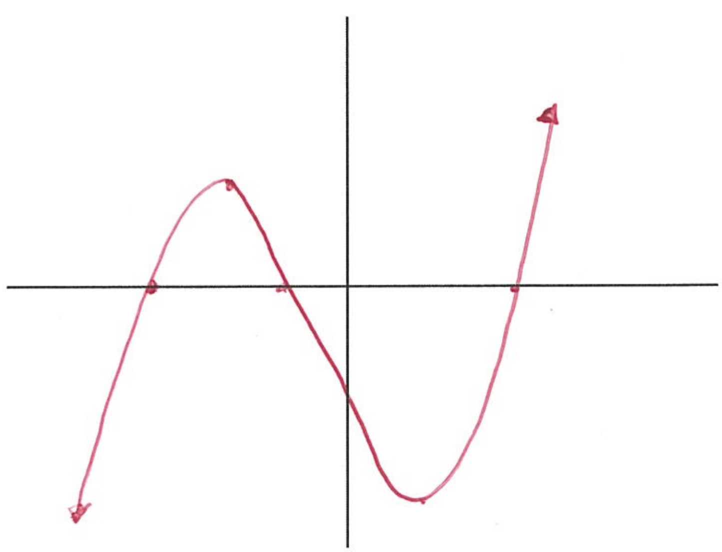
Range: ALL REALS

Y – Int: (0, −2)

End Behavior: LEFT DOWN; RIGHT UP

Zeros: SEE #1

Extreme Points: SEE #2



8. Find the traits and **sketch** of $y = -x^4 + 5x^2 - 4$.

Domain: ALL REALS

Range: $y \in (-\infty, 2.25]$

Y – Int: $(0, -4)$

End Behavior: BOTH ENDS DOWN

Zeros: SEE #3

Extreme Points: SEE #4