PreCalculus '13-14 Name: Solution Key

Dr. Quattrin

Polynomials Test-- CALCULATOR ALLOWED

Round to 3 decimal places. Score 50

Show all work.

1. Find the zeros of $y = 2x^3 + x^2 - 8x - 4$. Show the algebraic work to support the zeros.

$y = x^2(2x+1) - 4(2x+1)$

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

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

$(\pm 2, 0), (-1/2, 0)$

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

$\frac{dy}{dx} = 6x^2 - 2x - 8 = 0$

$2(x-1)(3x+4) = 0$

C.V. $x = 1, -4/3$

EV $y(1) = -9$;

$y(-4/3) = 3.704$

3. Find the zeros of $y=-x^4+10x^2-9$ on $x\in[-6,2]$. Show the algebraic work to support the zeros.

$y=-1(x^4-10x^2+9)$

$=-1(x^2-9)(x^2-1)=0$

$x=\pm 1, \pm 3$

$(\pm 1,0)$ $(\pm 3,0)$ BUT 3 IS NOT IN THE DOMAIN

$\therefore (-1,0)(1,0)(-3,0)$

4. Find the critical values and extreme values of $y=-x^4+10x^2-9$ on $x\in[-6,2]$. Show the derivative and algebra to support the critical values.

$\frac{dy}{dx}=-4x^3+20x$

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

$x=0, \pm\sqrt{5}$ BUT $\sqrt{5}$ IS NOT IN DOMAIN

CV AS END POINTS: $x=-6, 2$

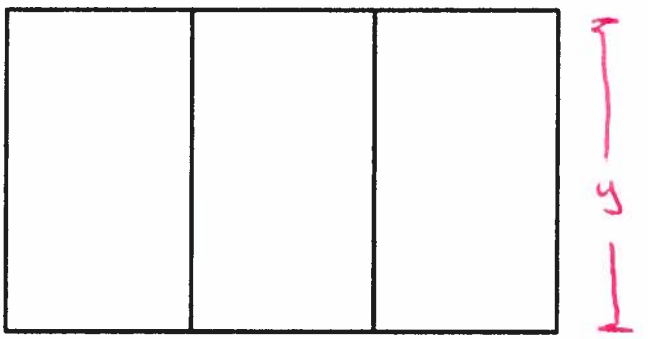
$y(0)=-9$

$y(-\sqrt{5})=16$

$y(2)=15$

$y(-6)=-945$

5. A 540 square foot field is surrounded and divided into three equal parts by a fence. What is the minimum amount of fencing to be used?



(1) MINIMIZE FENCE

(2) $F = 4y + 2x$ $\qquad A = xy = 540$

$y = \frac{540}{x}$

(3) $F = 4\left(\frac{540}{x}\right) + 2x$

$= 2160x^{-1} + 2x$

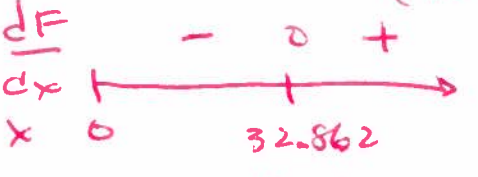
(4) $\frac{dF}{dx} = -2160x^{-2} + 2 = 0$

$2 = \frac{2160}{x^2}$

$x^2 = 1080$

$x = \pm 32.863$

(4b)



(4c) $y(32.863) = 16.432$

(5) $F = 131.453'$

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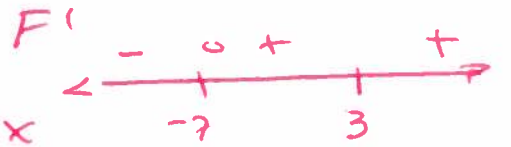
Polynomials Test—CALCULATOR NOT ALLOWED
Show all work. Score 20

6. Create a sign pattern for the function $f'(x)$ if $f(x)$ is decreasing from $-\infty$ to -7, increasing from -7 to 3, and increasing from 3 to ∞. Be sure to label the sign pattern appropriately. Then, determine whether each critical value represents a max, a min, or neither. Explain how you know for each.

f' IS + FOR f INCREASING AND f' IS − FOR f DECREASING ∴



7. Find the traits and **sketch** $y = 2x^3 + x^2 - 8x - 4$.

Domain: All Reals

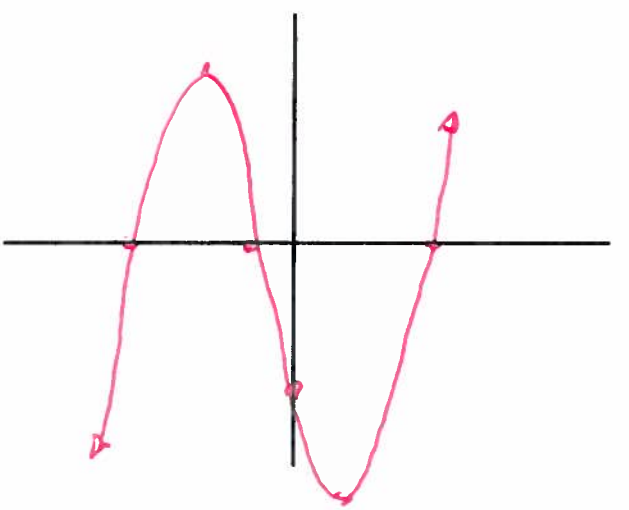
Range: All Reals

Y – Int: $(0, -4)$

End Behavior: ↙ ↗

Zeros: $(\pm 2, 0)$ $(-1/2, 0)$

Extreme Points: $(1, -9)$
$(-4/3, 3.704)$



8. Find the traits and **sketch** of $y = -x^4 + 10x^2 - 9$ on $x \in [-6, 2]$.

Domain: $x \in [-6, 2]$

Range: $y \in [-945, 16]$

***Y*– Int:** $(0, -9)$

End Behavior: NONE

Zeros: $(\pm 1, 0)\ (-3, 0)$

Extreme Points: $(0, -9)\ (-\sqrt{5}, 16)\ (2, 15)\ (-6, -945)$