PreCalculus '14-15 Name: Solution Key

Dr. Quattrin

Radical Test-- CALCULATOR ALLOWED

Round to 3 decimal places. Score ___________

Show all work.

1. Find the zeros and Domain of $y=\sqrt{-3x^3+x^2+48x-16}$. Show the supporting algebraic work.

$-x^2(3x-1)+16(3x-1)=0$

$x=\pm 4,\ 1/3$

$(\pm 4, 0)\ (1/3, 0)$

$-3x^3+x^2+48x-16$ / y^2	+	0	−	0	+	0	−
x		-4		$1/3$		4	

$x \in (-\infty, -4] \cup [1/3, 4]$

2. Find the extreme points of $y=\sqrt{-3x^3+x^2+48x-16}$. Show the derivative and algebra to support the critical values.

$$\frac{dy}{dx}=\frac{-9x^2+2x+48}{2(-3x^2+x^2+48x-16)^{1/2}}$$

i) $\frac{dy}{dx}=0 \Rightarrow -9x^2+2x+48=0$ $\quad x=\frac{-2\pm\sqrt{4+4(9)(48)}}{2(-9)}=\begin{cases}\cancel{-2.201} \\ 2.423\end{cases}$

ii) $\frac{dy}{dx}$ DNE $\Rightarrow x=\pm 4,\ 1/3$

$(\pm 4, 0)\ (1/3, 0)\ (2.423, 7.968)$

3. Find the domain and critical values of $y = \sqrt{5x^3 - 3x^2 + 5x - 3}$.

$x^2(5x-3) + 1(5x-3)$

$(x^2+1)(5x-3)$

y^2 $-$ 0 $+$

x $3/5$

$x \in [3/5, \infty)$

$$\frac{dy}{dx} = \frac{6x^2 - 6x + 5}{2[(x^2+1)(5x-3)]^{1/2}}$$

$$\frac{dy}{dx} = 0 \rightarrow x = \frac{6 \pm \sqrt{6^2 - 4(6)(5)}}{2(6)} = \text{NON}$$

$$\frac{dy}{dx} \text{ DNE} \rightarrow \boxed{x = 3/5}$$

4. Find the zeros and Domain of $y = \sqrt{-x^4 + 16x^2 - 63}$. Show the supporting algebraic work.

$$\cancel{\frac{-4x^3 + 48x}{2(-x^4 + 16x^2 - 63)^{1/2}}}$$

$-(x^4 - 16x^2 - 63)$

$-(x^2-9)(x^2-7)$

$x = \pm\sqrt{7}, \pm 3$

Zeros: $(\pm 3, 0)$ $(\pm\sqrt{7}, 0)$

y^2 $-$ 0 $+$ 0 $-$ 0 $+$ 0 $-$

x -3 $-\sqrt{7}$ $\sqrt{7}$ 3

$x \in [-3, -\sqrt{7}] \cup [\sqrt{7}, 3]$

5. **Find the extreme points of $y=\sqrt{-x^4+16x^2-63}$. Show the derivative and algebra to support the critical values.**

$$\frac{dy}{dx} = \frac{-4x^3 + 32x}{2[(x^2-7)(x^2-9)]^{1/2}} = \frac{-2x^3 + 16x}{\quad}$$

i) $\frac{dy}{dx} = 0$ $\quad -2x(2x^2 - 16) = 0 \rightarrow x = \cancel{0}, \pm\sqrt{8}$

$x = \cancel{0}, \pm\cancel{2\sqrt{3}}$ $\quad (\pm\sqrt{8}, 1)$

ii) $\frac{dy}{dx}$ DNE $\rightarrow$ $x = \pm 3, \pm\sqrt{7}$ $\quad (\pm 3, 0)\ (\pm\sqrt{7}, 0)$

PreCalculus '14-15 Name:______________________________

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Radical Test—CALCULATOR NOT ALLOWED

Show all work. Score __________

6a. $\frac{d}{dx}\left[\left(4x^3-9x^2\right)^5\right]$

$5(4x^3-9x^2)^4(12x^2-18x)$

6b. $\frac{d}{dx}\left[\sqrt[4]{6x^2-16x+3}\right]$

$= \frac{1}{4}(6x^2-16x+3)^{-3/4}(12x-16)$

$= \frac{3x-4}{(6x^2-16x+3)^{3/4}}$

7. Find the traits and **sketch** $y=\sqrt{-3x^3+x^2+48x-16}$.

Domain: $x \in (-\infty, -4] \cup [1/3, 4]$

Range: $y \in [0, \infty)$

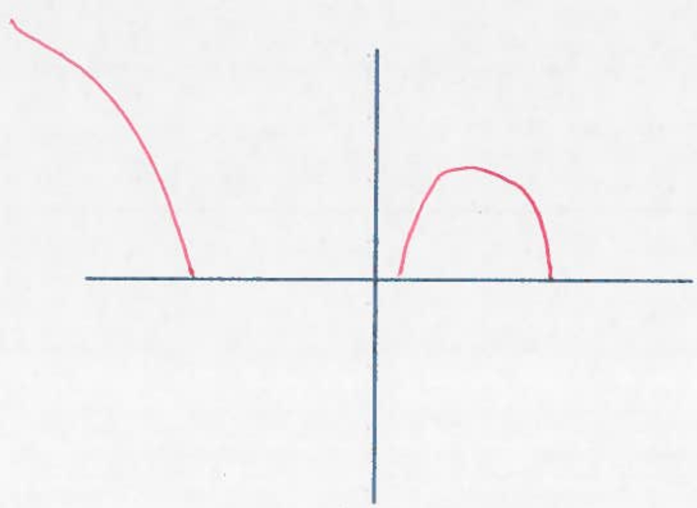
Y – Int: NONE

End Behavior: LEFT UP, RIGHT NONE

Zeros: $(\pm 4, 0)(1/3, 0)$

Extreme Points: $(\pm 4, 0)$ $(1/3, 0)$

2.423, 7.968



8. Find the traits and **sketch** of $y=\sqrt{-x^4+16x^2-63}$.

Domain: $x \in [-3, -\sqrt{7}] \cup [\sqrt{7}, 3]$

Y – Int: NONE

Zeros: $(\pm 3, 0)$ $(\pm \sqrt{7}, 0)$

Range: $y \in [0, 1]$

End Behavior: NONE

Extreme Points: $(\pm 3, 0)$ $(\pm \sqrt{7}, 0)$

$(\cancel{\pm 2\sqrt{3}}, (2\sqrt{2}, 1)$