Chapter 10 Practice Test
CALCULATOR ALLOWED   Score _____
Round to 3 decimal places.   Show all work.
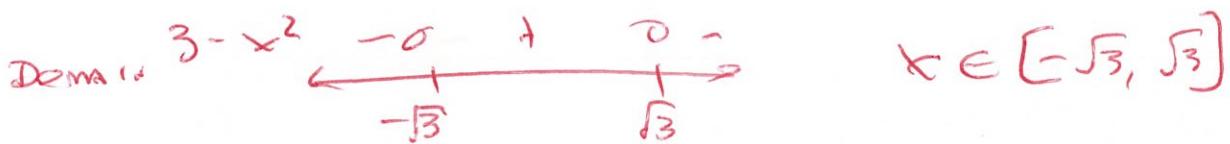
1.   Find domain and zeros of $y = (-2x^3)\sqrt{3-x^2}$.

ZEROS $(0,0)(\pm\sqrt{3}, 0)$

Domain $3-x^2$

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

2.   Find the extreme points of $y = (-2x^3)\sqrt{3-x^2}$. Show the algebraic work to support the critical values.

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

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

$$= \frac{2x^4 - 6x^2(3-x^2)}{(3-x^2)^{\frac{1}{2}}} = \frac{8x^4 - 18x^2}{(3-x^2)^{\frac{1}{2}}} = \frac{2x^2(4x^2-9)}{(3-x^2)^{\frac{1}{2}}}$$

i) $\frac{dy}{dx} = 0 \Rightarrow 0, \pm\frac{3}{2}$ BUT 0 IS A BOUNCER

ii) $\frac{dy}{dx}$ DNE $\Rightarrow x = \pm\sqrt{3}$

iii) NONE

$(1.5, -5.846)$ $(-1.5, 5.846)$

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

3. Find domain and zeros of $y=(x^2-7)e^{-x/2}$.

Zeros: $x = \pm\sqrt{7}$

Domain: All Reals (no $\sqrt{}$, ln, or denom)

4. Find the extreme points of $y=(x^2-7)e^{-x/2}$. Show the algebraic work to support the critical values.

$$\frac{dy}{dx}=(x^2-7)e^{-x/2}\left(-\tfrac{1}{2}\right)+e^{-x/2}(2x)$$

$$=\left(-\tfrac{1}{2}x^2+2x+\tfrac{7}{2}\right)e^{-x/2}=0$$

$$x=\frac{-2\pm\sqrt{4-4(-\tfrac{1}{2})(\tfrac{7}{2})}}{2(-\tfrac{1}{2})}=\begin{cases}-1.317\\5.317\end{cases}$$

$(-1.317, -10.172)$

$(5.317, 1.490)$

5.   Find domain, VAs, and zeros of $y = \ln(x^3 - 7x + 6)$.

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

VA: $x = -3, 1, 2$

DOMAIN $\dfrac{x^3 - 7x + 6}{6}$ $\;-\;\circ\;+\;\circ\;-\;\circ\;+$

$-3 \qquad 1 \qquad 2$

$x \in (-3, 1) \cup (2, \infty)$

ZEROS $(-2.949, 0)$ $(.783, 0)$ $(2.167, 0)$

6.   Find the extreme points of $y = \ln(x^3 - 7x + 6)$ on $x \in (-3, 3)$. Show the algebraic work to support the critical values.

$$\frac{dy}{dx} = \frac{3x^2 - 7}{x^3 - 7x + 6}$$

i) $3x^2 - 7 = 0 \Rightarrow x = \pm\sqrt{7/3} \doteq -1.528$

(NOT $+1.528$ BECAUSE OF DOMAIN)

ii) $\dfrac{dy}{dx} = $ DNE $\Rightarrow x = -3, 1, 2$ BUT THESE ARE VAS

iii) NEITHER ENDPOINT IS INCLUDED.

$(-1.528, 2.575)$

7. $y = (4x-3)^9 (3x^7+1)^3$. Find $\dfrac{dy}{dx}$ in factored form.

$u = (4x-3)^9$

$D_u = 9(4x-3)^8 (4)$

$v = (3x^7+1)^3$

$D_v = 3(3x^7+1)^2 (21x^6)$

$\dfrac{dy}{dx} = (4x-3)^9 \left[\dfrac{63x^6}{36} (3x^7+1)^2 \right] + (3x^7+1)^3 \left(36 (4x-3)^8 \right)$

$= 9 (4x-3)^8 (3x^7+1)^2 \left[7x^6 (4x-3) + 4 (3x^7+1) \right]$

$= 9 (4x-3)^8 (3x^7+1)^2 (28x^7 - 21x^6 + 12x^7 + 4)$

$= 9 (4x-3)^8 (3x^7+1)^2 (40x^7 - 21x^6 + 4)$
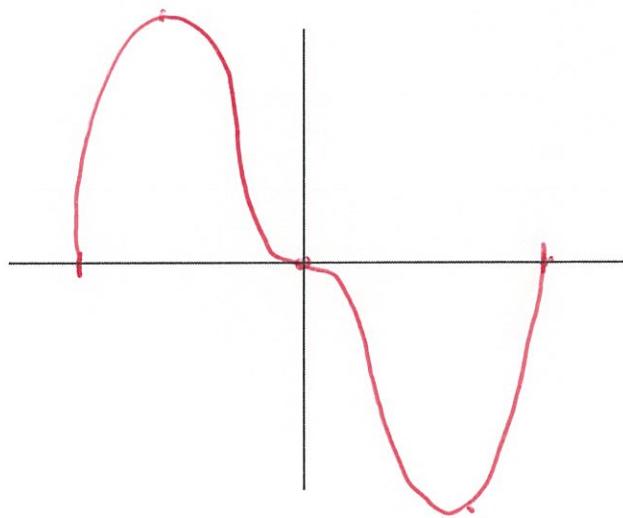
8. Find the traits and sketch $y = (-2x^3)\sqrt{3-x^2}$.

Y-intercept: $(0,5)$ Range: $y \in [-5.846, 5.846]$

End Behavior (Left): NONE   End Behavior (Right):
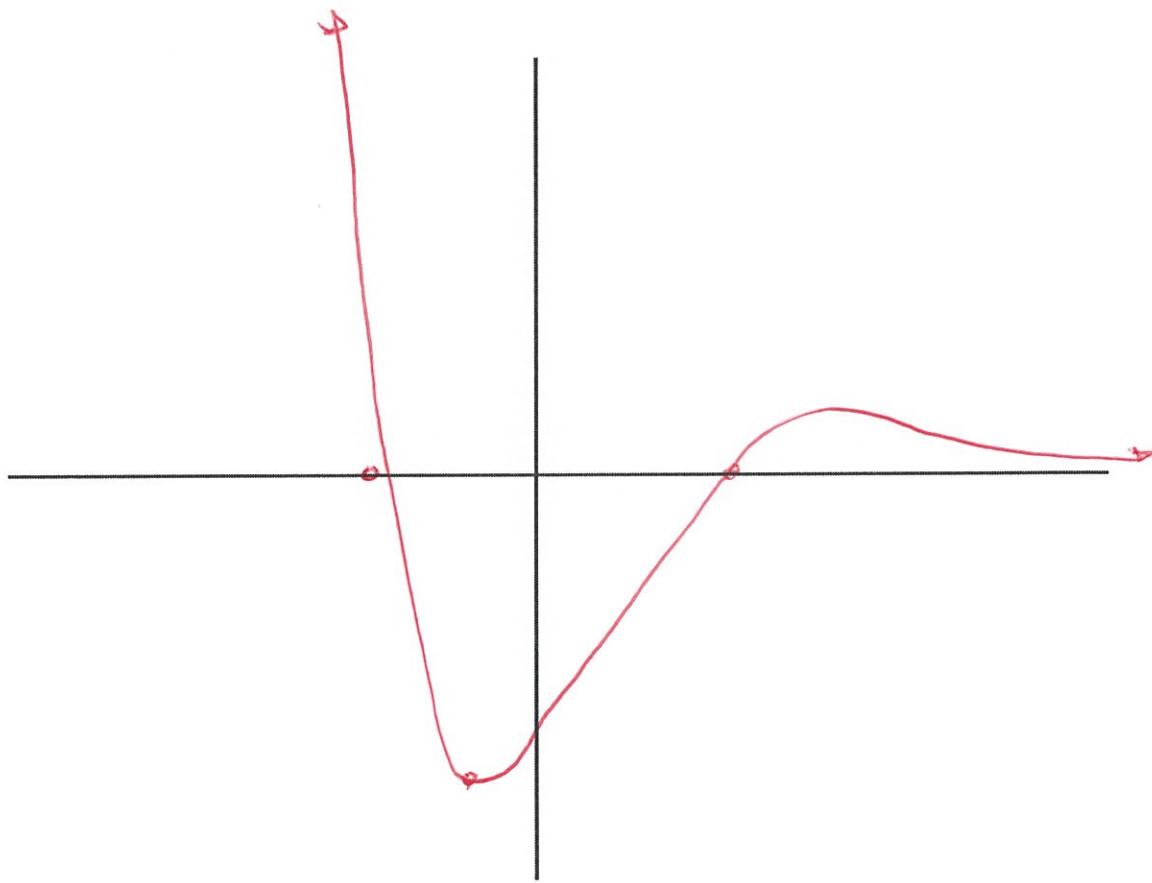
9. Find the traits and **sketch** of $y = (x^2 - 7)e^{-x/2}$.

Y-intercept: $(0, -7)$

Range: $y \in [-10.172, \infty)$

End Behavior (Left):

End Behavior (Right): $y = 0$

EC. Find the traits and **sketch** of $y = \ln(x^3 - 7x + 6)$ on $x \in (-3, 3)$.

Y-intercept: $(0, \ln 6)$

Range: $y \in (-\infty, 2.575]$

End Behavior (Left): HONE

End Behavior (Right): NONE