PreCalculus ACC '17-18   Name: <ins>Solution Key</ins>
Chapter 10 Test
CALCULATOR ALLOWED   Score _____
Round to 3 decimal places.   Show all work.

1.   Find domain and zeros of $y=(-x^2)\sqrt{9-x^2}$.

ZEROS $(0,0)$ $(\pm 3,0)$

DOMAIN $9-x^2$

$x \in [-3,3]$

2.   Find the extreme points of $y=(-x^2)\sqrt{9-x^2}$. Show the algebraic work to support the critical values.

$$\frac{dy}{dx} = -x^2 \left[\frac{1}{2}(9-x^2)^{-1/2}(-2x) \right] + (9-x^2)^{1/2}(-2x)$$

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

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

i) $3x(x^2-6)=0$
   $x=\cancel{0} \pm \sqrt{6}$

ii) $9-x^2=0 \Rightarrow x=\pm 3$

iii) NONE GIVEN

$(\pm 3, 0)$ $(\sqrt{6}, -6\sqrt{3})$
$(-\sqrt{6}, \mp 6\sqrt{3})$

3. Find domain and zeros of $y=(4x-x^2)e^{2x}$.

DOMAIN: ALL REALS

ZEROS: $(0,0)(4,0)$

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

$$\frac{dy}{dx} = (4x-x^2)e^{2x}(2) + e^{2x}(4-2x)$$

$$= e^{2x}(-2x^2+6x+4) = -2e^{2x}(x^2-3x-2)$$

i) $\frac{dy}{dx} = 0 \Rightarrow x = \dfrac{3\pm\sqrt{9-4(1)(-2)}}{2} = \dfrac{3\pm\sqrt{17}}{2} = \begin{cases} 3.562 \\ -.562 \end{cases}$

$(3.562, 1936.787)$

$(-.562, -.833)$

$$-x^2(8x+1) + \tfrac{1}{4}(2x+1)$$

5. Find domain, VAs, and zeros of $y = \ln\left(-2x^3 - x^2 + 8x + 4\right)$.

VAs: $x = \pm 2, \ -\tfrac{1}{2}$

Domain $x \in (-\infty, -2) \ (-\tfrac{1}{2}, 2)$

Zeros $(-.371, 0) \ (-2.078, 0) \ (1.948, 0)$

6. Find the extreme points of $y = \ln\left(-2x^3 - x^2 + 8x + 4\right)$ on $x \in [-4, 2)$. Show the algebraic work to support the critical values.

$$\frac{dy}{dx} = \frac{-6x^2 - 2x + 8}{-2x^3 - x^2 + 8x - 14}$$

i) $x = \dfrac{2 \pm \sqrt{4 - 4(-6)(8)}}{2(-6)} = \cancel{-2} \ , \ \cancel{-\tfrac{4}{3}} \ \overset{\text{NOT}}{\underset{\text{DOMAIN}}{\text{IN}}} \ (1, \ 2.197)$

ii) $x = \pm 2, -\tfrac{1}{2}$ BUT THESE ARE VAS

iii) $x = -4 \qquad (-4, \ 4.431)$

7.   Find the traits and **sketch** $y = \left(-x^2\right)\sqrt{9-x^2}$.

Y-intercept: $(0, 0)$

Range: $y \in \left[-6\sqrt{3}, 0\right]$

End Behavior (Left): NONE

End Behavior (Right): NONE
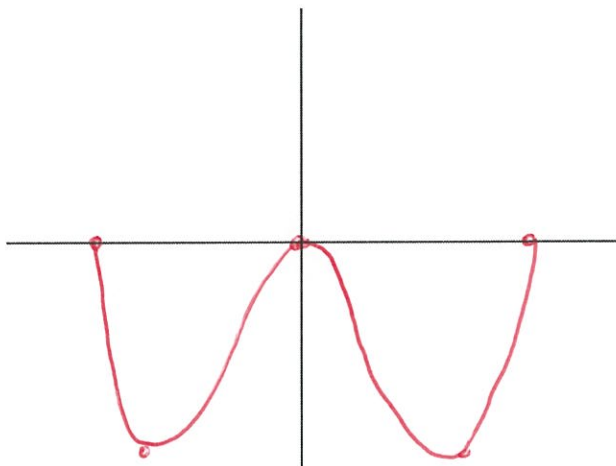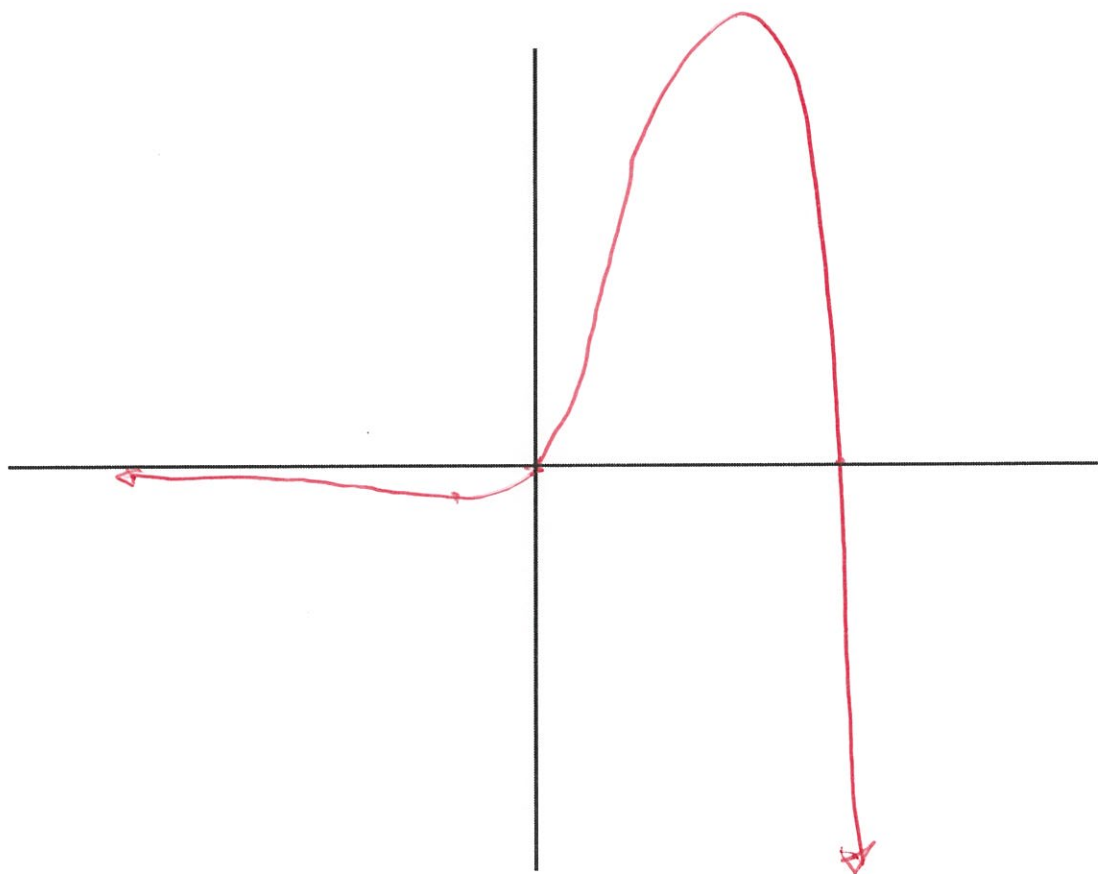
8. Find the traits and **sketch** of $y=(4x-x^2)e^{2x}$.

Y-intercept: $(0,0)$

Range: $(-\infty, 936.767]$

End Behavior (Left): $y=0$

End Behavior (Right): DOWN

EC. Find the traits and **sketch** of $y = \ln\left(-2x^3 - x^2 + 8x + 4\right)$ on $x \in [-4, 2)$.

Y-intercept: $\left(0, \ln 4\right)$

Range: $\left(-\infty, 4.431\right]$

End Behavior (Left): NONE

End Behavior (Right): NONE