PreCalculus ACC '19-20 Name: SOLUTION KEY
Chapter 10 Test – Form A
CALCULATOR ALLOWED Score _____
Round to 3 decimal places. Show all work.

Find the derivative of each of the following functions.

1a. $f(x)=e^{5x^2+x^4}$

$f' = e^{5x^2+x^4}(10x+4x^3)$

1b. $g(x)=\tan^4 x$

$g'(x) = 4\tan^3 x \sec^2 x$

1c. $h(x)=\sin x^4$

$h' = \cos x^4 (4x^3$

1d. $p(x)=x\csc x$

$p' = x(-\csc x \cot x) + \csc x (1)$

$= \csc x (1 - x\cot x)$

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

$(-1,0)$

$(\pm 3,0)$

$x \in [-3,3]$

3. Find the extreme points of $y=(x+1)\sqrt{9-x^2}$. Show the algebraic work to support the critical values.

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

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

i) $\frac{dy}{dx} = 0 \rightarrow x = \frac{1 \pm \sqrt{1+72}}{-4} = \begin{cases} -2.386 \\ 1.806 \end{cases}$

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

iii) NO END POINTS GIVEN

$(\pm 3, 0)$ $(-2.386, -2.520)$

$(1.806, 6.733)$

4. Find domain and x – intercepts of $y=(x^2-3x-10)e^{-\frac{1}{2}x}$.

$(x-5)(x+2)$

$(5,0)\ (-2,0)$

DOMAIN ALL REALS

5. Find the extreme points of $y=(x^2-3x-10)e^{-\frac{1}{2}x}$. Show the algebraic work to support the critical values.

$$\frac{dy}{dx}=(x^2-3x-10)e^{-1/2x}(-1/2)+e^{-1/2x}(2x-3)$$

$$=-\frac{1}{2}e^{-1/2x}\left[x^2-3x-10-4x+6\right]$$

$$=-\frac{1}{2}e^{-1/2x}(x^2-7x-4)$$

$$\frac{dy}{dx}=0 \rightarrow x=\frac{7\pm\sqrt{63}}{2}=\begin{cases}-.531\\ 7.531\end{cases}$$

$(-.531,\ -10.595)$

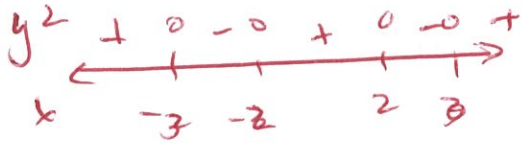
$(7.531,\ .558)$

6. Find domain, VAs, and $x-$ intercepts of $f(x)=\ln\left(x^4-13x^2+36\right)$ on $x\in[-4,5]$.

$(x^2-9)(x^2-4)$

VAs @ $x=\pm 3,\ \pm 2$

Zeros: $(\pm 1.851, 0)$
$(\pm 3.032, 0)$



DOMAIN $y\in[-4,-3)\cup(-2,2)\cup(3,5]$

7. Find the extreme points of $f(x)=\ln\left(x^4-13x^2+36\right)$ on $x\in[-4,5]$. Show the algebraic work to support the critical values.

$$\frac{dy}{dx}=\frac{4x^3-26x}{(x^2-9)^2(x^2-4)^2}$$

i) $\frac{dy}{dx}=0 \rightarrow x=0,\ \pm\sqrt{13/2}$ $(0, \ln 36)$

ii) $\frac{dy}{dx}$ DNE $\rightarrow x=\pm 3,\ \pm 2$ NOT EXTREMES

iii) END POINTS $x=-4,\ 5$ $(-4, 4.431)$ $(5, 5.817)$

8. Find the traits and **sketch** $y=(x+1)\sqrt{9-x^2}$.

Domain: $x \in [-3, 3]$

Range: $y \in [-2.529, 6.733]$

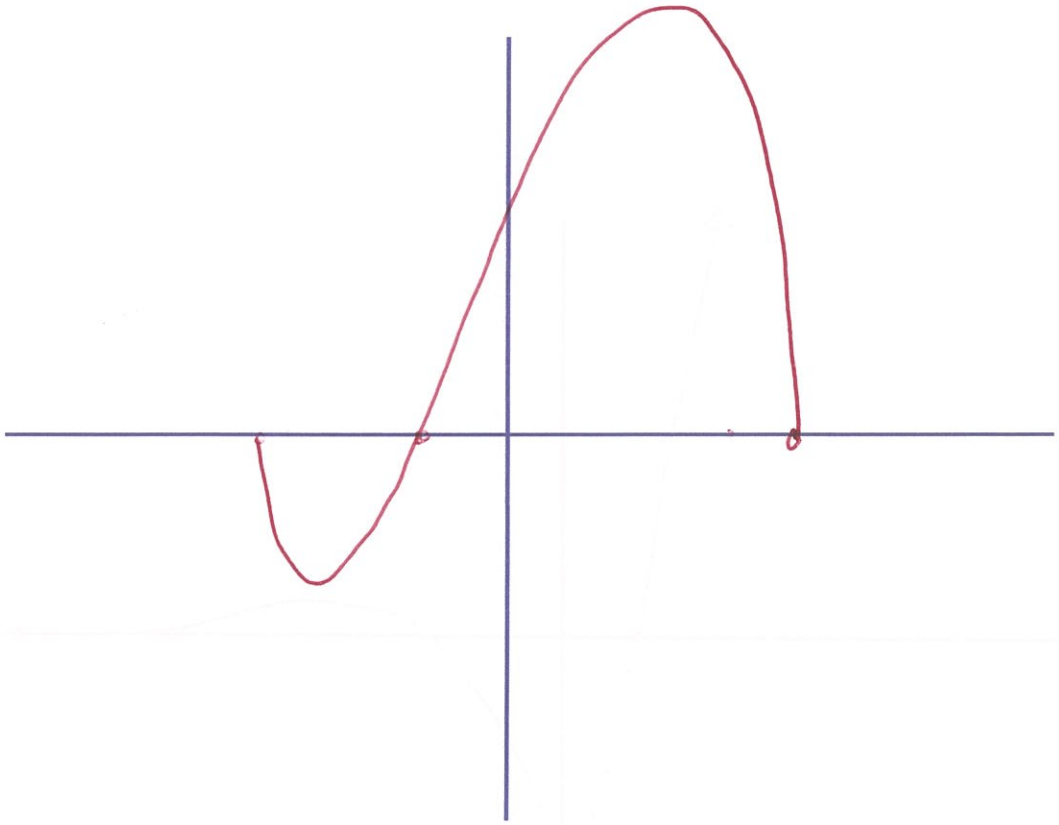
x – intercepts: $(-1, 0)$ $(\pm 3, 0)$

y – intercept: $(0, 3)$

Extreme Points: See #3

End Behavior (Left): NONE

End Behavior (Right): NONE



9. Find the traits and **sketch** of $y=\left(x^2-3x-10\right)e^{-\frac{1}{2}x}$.

Domain: ALL REALS

Range: $y \geq -10.595$

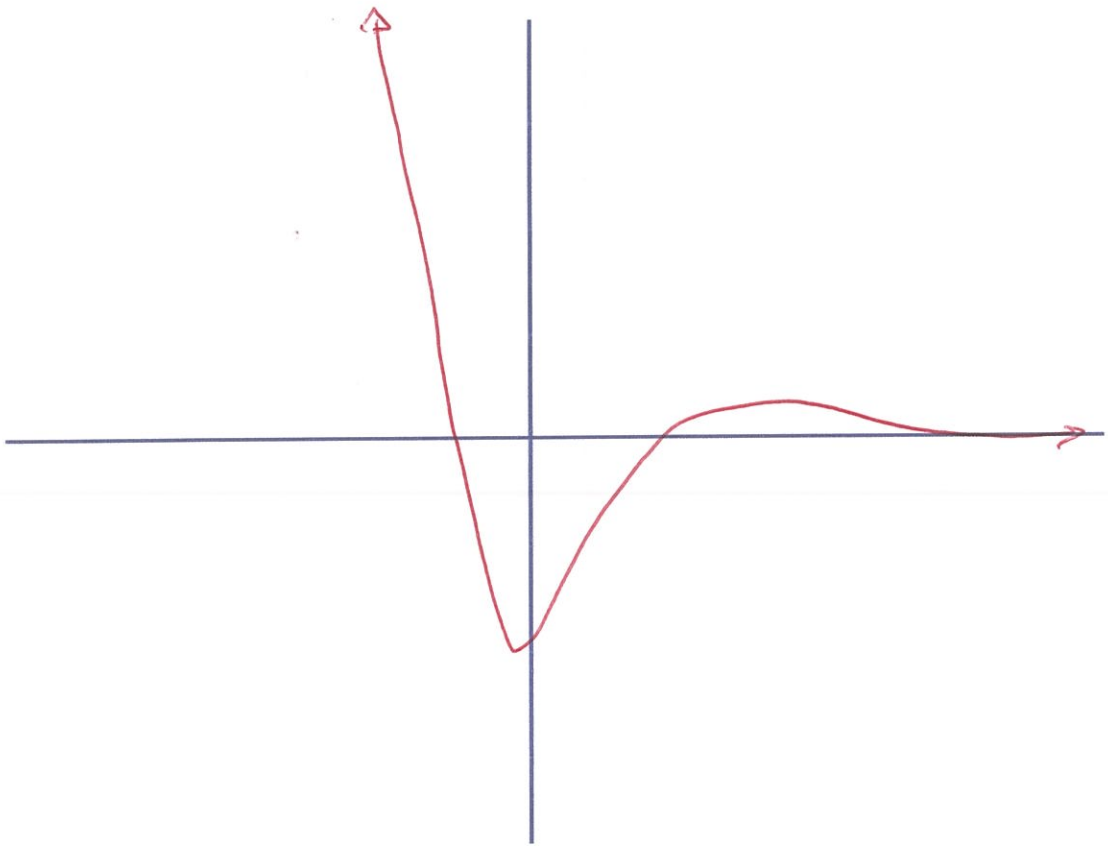
x – intercepts:

y – intercept: $(0, -10)$

Extreme Points: SEE # 5

End Behavior (Left): UP

End Behavior (Right): $y=0$



10. Find the traits and **sketch** of $f(x)=\ln\left(x^4-13x^2+36\right)$ on $x\in[-4,5]$.

Domain: See #6

Range: $y\in(-\infty, 5.817]$

VAs: $x=\pm 2,\ \pm 3$

y – intercept: $(0,\ 3.584)$

Extreme Points: See #7

End Behavior (Left): NONE

End Behavior (Right): NONE