PreCalc ACC '18 **Name:** Solution Key

Spring Practice Final – Part 1

Calculator Allowed **score** _____

Show all work. Round to 3 decimals.

1. Find the following derivatives:

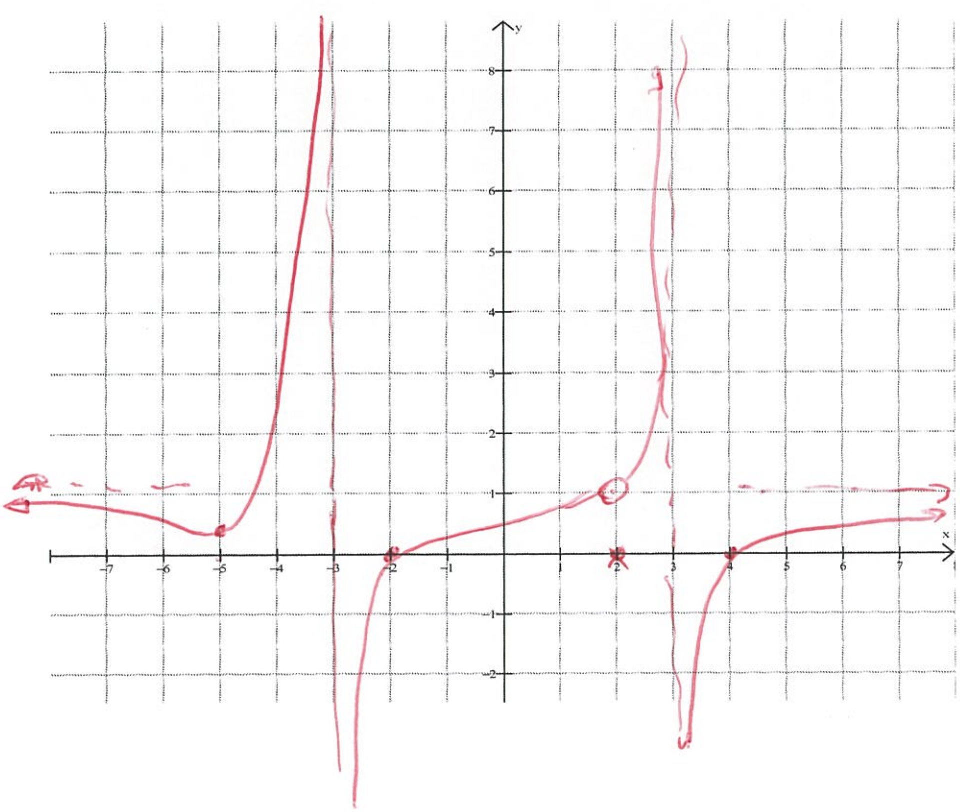
a. $\frac{d}{dx}\left(\tan 3x^2\right) = \left(\sec^2 3x^2\right)(6x)$

b. $\frac{d}{dx}\left(\ln\left(x^2+4\right)\right) = \frac{2x}{x^2+4}$

c. $\frac{d}{dx}\left(e^x \csc x\right) = e^x(-\csc x \cot x) + \csc x(e^x) = e^x \csc x\left[-\cot x + 1\right]$

d. $\frac{d}{dx}\left(\frac{e^x}{16-x^2}\right) = \frac{(16-x^2)e^x - e^x(-2x)}{(16-x^2)^2} = \frac{e^x(-x^2+2x+16)}{(16-x^2)^2}$

2. Sketch a graph of a function with the following traits:



Domain: $x \neq \pm 3, 2$

Zeroes: (–2,0) (4,0)

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

POE: (2,1)

y-intercept: (0, 0.375)

Extremes: (–5, 0.250)

End Behavior: $y = 1$

Range: $y \in (-\infty, \infty)$

3. Find domain and zeros of $y = \sqrt{-x^3 - 2x^2 + 3x}$.

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

ZEROS: $(-3,0)(1,0)\ (0,0)$

DOMAIN

y^2: $+\ 0\ -\ 0\ +\ 0\ -$ on the number line with marks at -3, 0, 1

$x \in (-\infty, -3] \cup [0, 1]$

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

$$\frac{dy}{dx} = \frac{1}{2}(-x^3-2x^2+3x)^{-1/2}(-3x^2-4x+3)$$

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

i) $\frac{dy}{dx} = 0 \to -3x^2-4x+3=0 \to x = \frac{4 \pm \sqrt{16+36}}{2(-3)} = \begin{cases} -1.\cancel{86}9 \\ .535 \end{cases}$

$(.535, .938)$

ii) $\frac{dy}{dx}$ DNE $\to x = 0, -3, 1$

$(0,0)$

$(-3,0)$

$(1,0)$

iii) ENDPOINTS: NONE GIVEN

5. Find domain and zeros of $f(x) = x^3 + 7x^2 - 2x - 14$. $= x^2(x+7) - 2(x+7)$

DOMAIN ALL REALS

ZEROS $(\pm\sqrt{2}, 0)$
$(-7, 0)$

6. Find the extreme points of $f(x) = x^3 + 7x^2 - 2x - 14$ on $x \in [-8, 2]$. Show the algebraic work to support the critical values.

i) $\frac{dy}{dx} = 3x^2 + 14x - 2 = 0$

$$x = \frac{-14 \pm \sqrt{14^2 - 4(3)(-2)}}{6} = \begin{cases} .139 \\ -4.805 \end{cases}$$

ii) NONE

iii) $(2, 18)$ $(.139, -14.140)$

$(-8, -62)$ $(-.4805, 46.288)$

7. Find the Point of Inflection for $f(x) = x^3 + 7x^2 - 2x - 14$ on $x \in [-8, 2]$. Show the algebraic work to support the result.

$f''(x) = 6x + 14 = 0$

$x = 7/3$ $(7/3, 3.148)$

8. Find domain, VAs, and zeros of $g(x)=\frac{x^3-9x}{x^4-13x^2+36}$. $=\frac{(x-3)(x+3)x}{(x^2-9)(x^2-4)} \approx \frac{x}{x^2-4}$

Domain $x \neq \pm 3, \pm 2$

VAs: $x = \pm 2$

Zeros: $(0, 0)$

9. Find the extreme points of $g(x)=\frac{x^3-9x}{x^4-13x^2+36}$. Show the algebraic work to support the critical values.

$$\frac{dy}{dx} = \frac{(x^2-4)(1) - x(2x)}{(x^2-4)^2} = \frac{-x^2-4}{(x^2-4)^2}$$

i) $-x^2-4=0$ NONE

ii) $x^2-4=0 \Rightarrow x=\pm 2$ BUT THESE ARE VAS

iii) NO END POINTS GIVEN

$\therefore$ NO EXTREMES

10. Find domain, VAs, and zeros of $f(x) = x^2 e^{x^2-5}$.

DOMAIN: ALL REALS

VAs: NONE

ZERO: $(0, 0)$

11. Find the extreme points of $f(x) = x^2 e^{x^2-5}$. Show the algebraic work to support the critical values.

$f'(x) = x^2 e^{x^2-5}(2x) + e^{x^2-5}(2x)$

$= 2x e^{x^2+5}(x^2+1)$

$f' = 0 \rightarrow x = 0 \quad (0, 0)$

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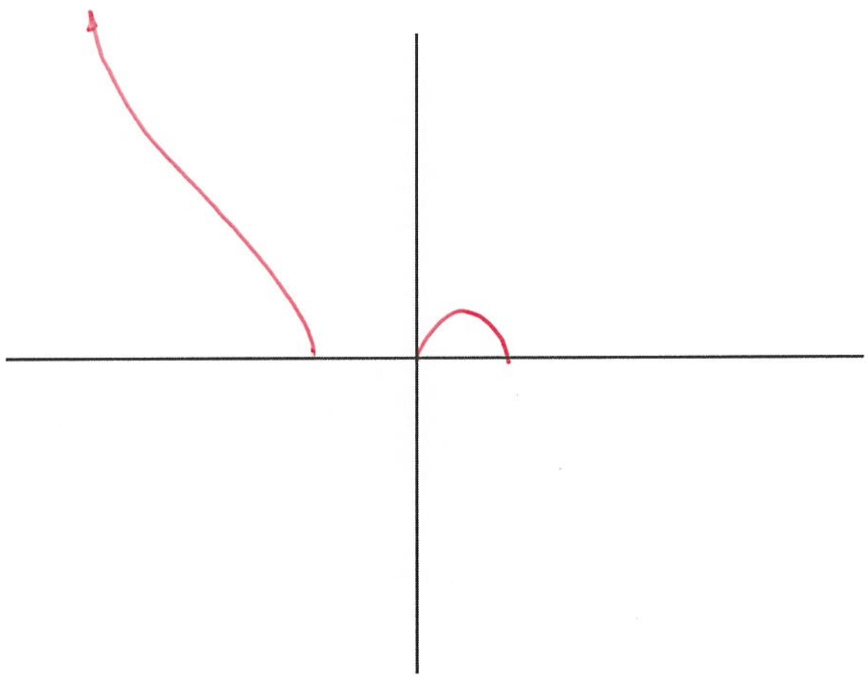
Spring Practice Final – Part 2
NO Calculator Allowed **score:_____**

Show all work. Round to 3 decimals.

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

Y-intercept: $(0, 0)$ Range: $y \in [0, \infty)$

End Behavior (Left): UP End Behavior (Right): NONE



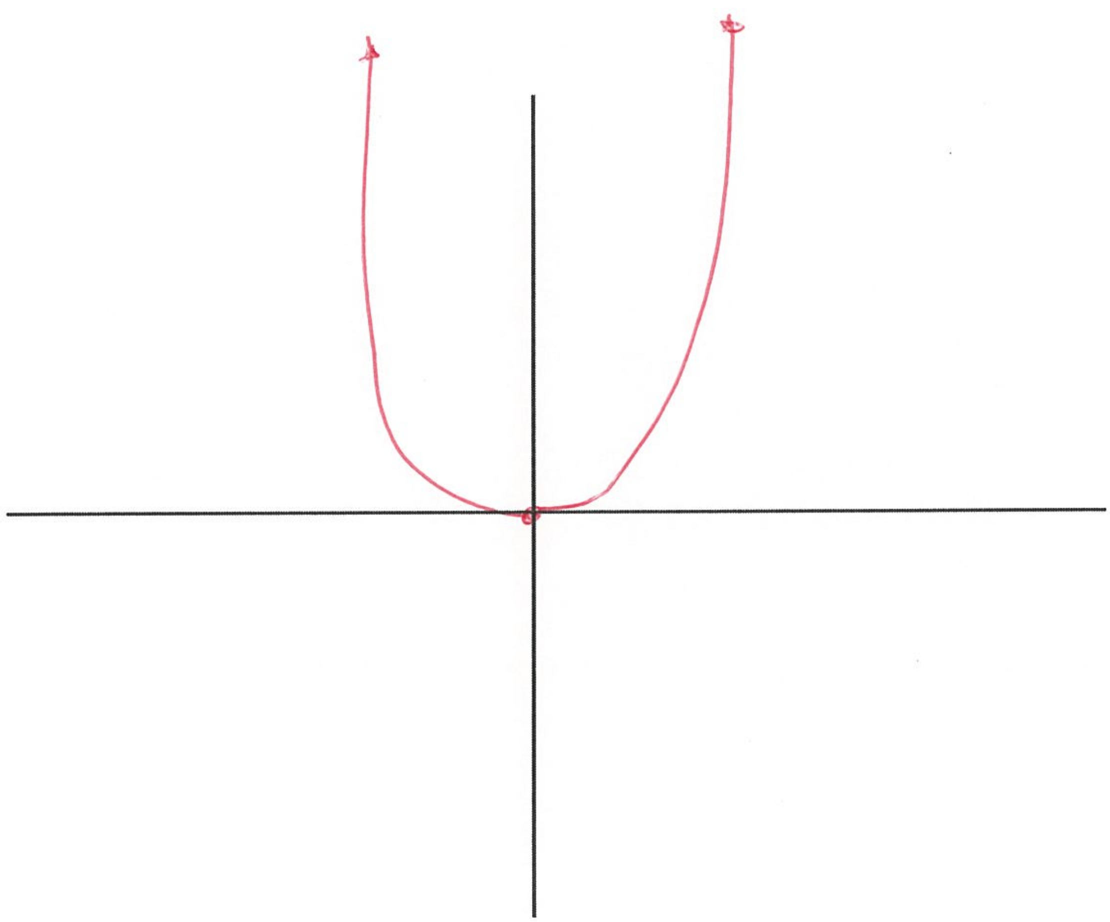
13. Find the traits and **sketch** of $f(x) = x^2 e^{x^2-5}$.

Y-intercept: $(0,0)$

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

End Behavior (Left): ~~$y=0$~~ UP

End Behavior (Right): UP



14. **Sketch** $f(x)=x^3+7x^2-2x-14$ on $x\in[-8,2]$. Show the sign patterns for $f(x)$, $f'(x)$, and $f''(x)$.

$f(x)$: $-$ 0 $+$ 0 $-$ 0 $+$

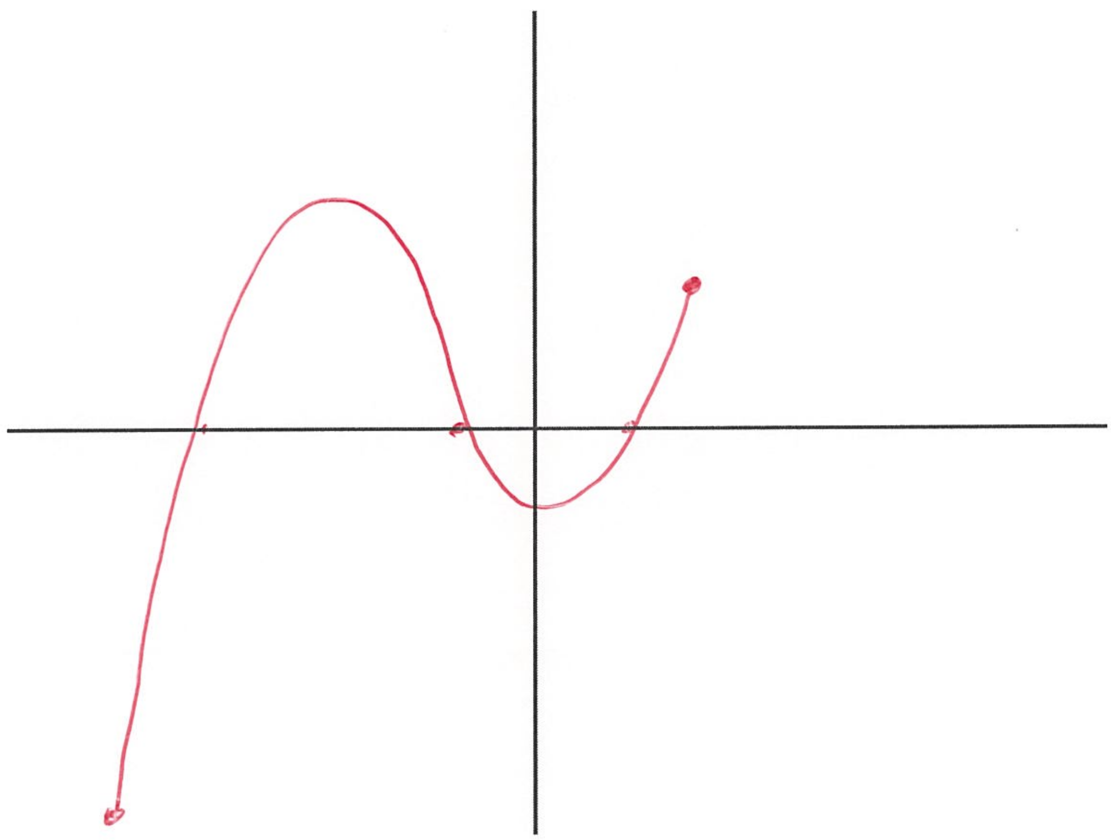
-7 $\quad -\sqrt{2}$ $\quad \sqrt{2}$

$f'(x)$: $+$ 0 $-$ 0 $+$

-4.805 $\quad .139$

$f''(x)$: $-$ 0 $+$

$7/3$



15. **Sketch** of $g(x)=\dfrac{x^3-9x}{x^4-13x^2+36}$.

POES: $(3, \frac{3}{5})$

$(-3, -\frac{3}{5})$

EB: $y=0$