

PreCalculus ACC '19-20
Chapter 10 Test - Form B
CALCULATOR ALLOWED

Name: Savannah Key

Score _____

Round to 3 decimal places. Show all work.

Find the derivative of each of the following functions.

1a. $f(x) = e^{x^4 - 3x^2} = e^{x^4 - 3x^2} (4x^3 - 6x)$

1b. $g(x) = \cot^4 x = 4 \cot^3 x (-\csc^2 x)$
 $= -4 \csc^2 x \cot^3 x$

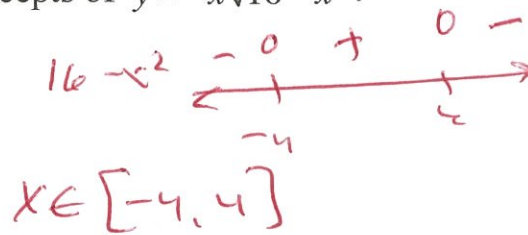
1c. $h(x) = \sec^4 x = \sec^3 x \tan x (4x^3)$

1d. $p(x) = x \sin x = x \cos x + \sin x (1)$

2. Find domain and x -intercepts of $y = -x\sqrt{16-x^2}$.

$$(0, 0)$$

$$(\pm 4, 0)$$



3. Find the extreme points of $y = -x\sqrt{16-x^2}$. Show the algebraic work to support the critical values.

$$\frac{dy}{dx} = -x \left(\frac{1}{2} (16-x^2)^{-1/2} \right) (-2x) + (16-x^2)^{1/2} (-1)$$

$$= \frac{x^2}{(16-x^2)^{1/2}} - (16-x^2)^{1/2}$$

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

$$= \frac{2x^2 - 16}{(16-x^2)^{1/2}}$$

$$i) \cancel{2x^2 - 16} \cdot 2(x^2 - 8) = 0$$

$$x = \pm 2\sqrt{2}$$

$$ii) 16 - x^2 = 0 \rightarrow x = \pm 4$$

iii) NO ENDPOINTS GIVEN

$$(\pm 4, 0)$$

$$(2\sqrt{2}, -8)$$

$$(-2\sqrt{2}, 8)$$

4. Find domain and x -intercepts of $y = (x^2 - 4x - 5)e^{\frac{1}{2}x}$.

Domain: ALL REALS

$$(x-5)(x+1)e^{\frac{x}{2}}$$

Zeros (5,0) (-1,0)

5. Find the extreme points of $y = (x^2 - 4x - 5)e^{\frac{1}{2}x}$. Show the algebraic work to support the critical values.

$$\frac{dy}{dx} = (x^2 - 4x - 5)e^{\frac{1}{2}x} \left(\frac{1}{2}\right) + e^{\frac{1}{2}x} (2x - 4)$$

$$= \frac{1}{2}e^{\frac{1}{2}x} \left(\frac{x^2 - 4x - 5}{2} + 2x - 4 \right) = 0$$

$$x = \pm \sqrt{\frac{13}{2}}$$

$$\left(\sqrt{\frac{13}{2}}, -5.272 \right)$$

$$\left(-\sqrt{\frac{13}{2}}, .5 \right)$$

6. Find domain, VAs, and x -intercepts of $f(x) = \ln(36x - x^3)$.

VAs: $x = \pm 6, 0$

$$36x - x^3 \begin{matrix} + & 0 & - & 0 & + & 0 & - \\ \leftarrow & | & & | & & | & \rightarrow \\ & -6 & & 0 & & 6 & \end{matrix}$$

Domain $x \in (-\infty, -6) \cup (0, 6)$

7. Find the extreme points of $f(x) = \ln(36x - x^3)$. Show the algebraic work to support the critical values.

$$f'(x) = \frac{1}{36x - x^3} (36 - 3x^2)$$

$$= \frac{36 - 3x^2}{36x - x^3}$$

i) $\frac{dy}{dx} = 0 \rightarrow 36 - 3x^2 = 0 \rightarrow x = \pm 2\sqrt{3}$

ii) $\frac{dy}{dx} \text{ DNE} \rightarrow 36x - x^3 = 0 \rightarrow x = \pm 6, 0$

iii) NONE

$$(2\sqrt{3}, 4.421)$$

8. Find the traits and sketch $y = -x\sqrt{16-x^2}$.

Domain: $x \in [-4, 4]$

Range: $y \in [-8, 8]$

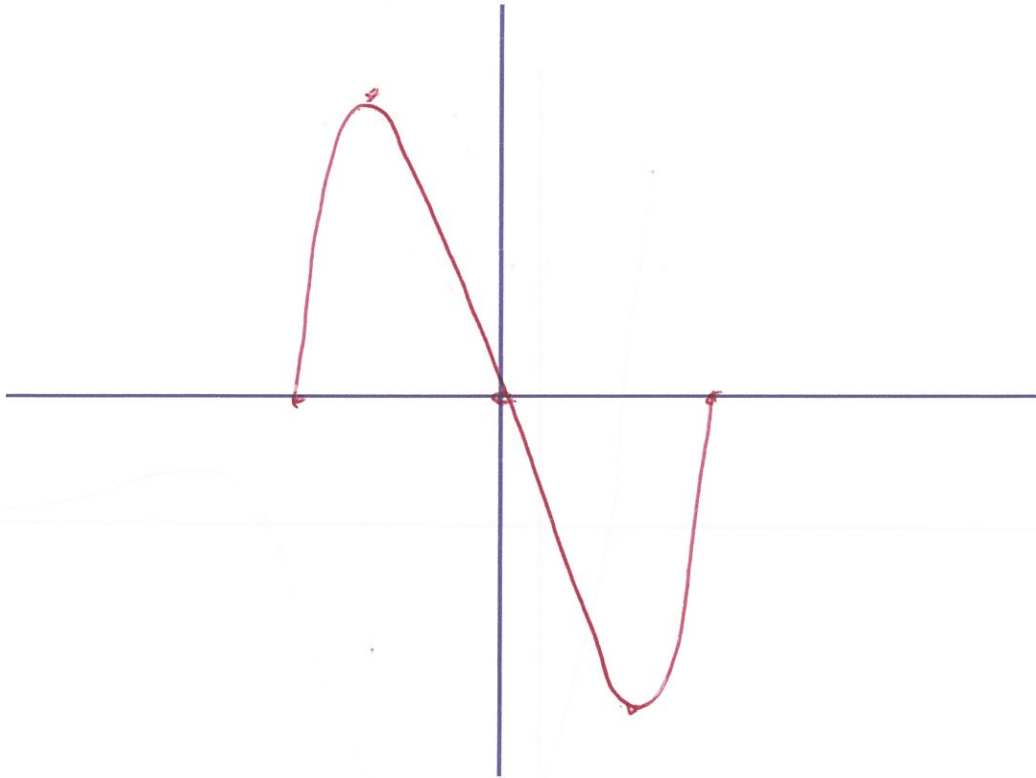
x - intercepts: $(0, 0)$ $(\pm 4, 0)$

y - intercept: $(0, 0)$

Extreme Points: $(4, 0)$
 $(2\sqrt{2}, -8)$ $(-2\sqrt{2}, 8)$

End Behavior (Left): NONE

End Behavior (Right): NONE



9. Find the traits and **sketch** of $y = (x^2 - 4x - 5)e^{\frac{1}{2}x}$.

Domain: All Reals

Range: $y \geq -5.272$

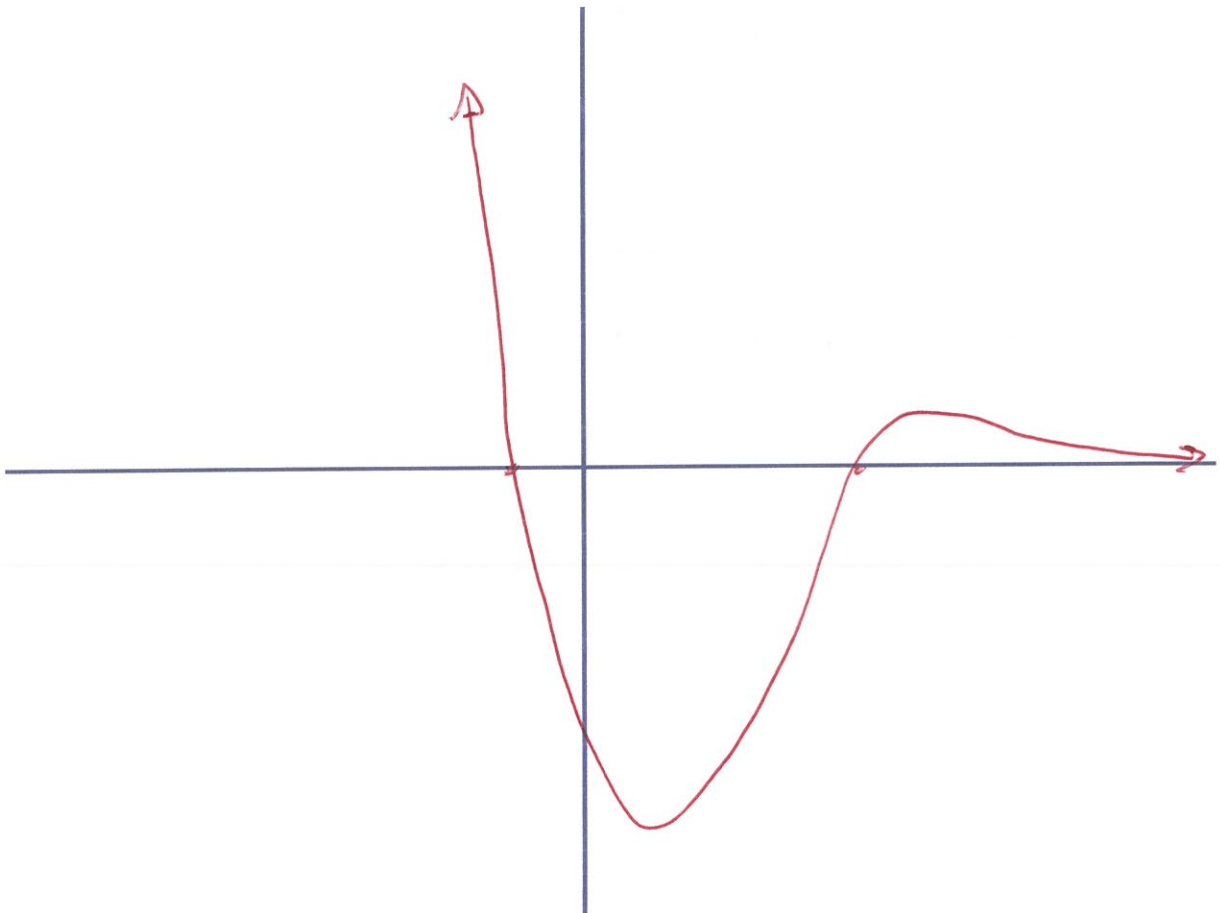
x - intercepts: ~~(-5, 0)~~ (5, 0)
(1, 0)

y - intercept: (0, -5)

Extreme Points: See #5

End Behavior (Left): ∞

End Behavior (Right): $y = 0$



10. Find the traits and **sketch** of $f(x) = \ln(36x - x^3)$

Domain: $x \in (-\infty, -6) \cup (0, 6)$

Range: All reals

VAs: $x = \pm 6, 0$

y - intercept: NONE

Extreme Points: SEE #7

End Behavior (Left): UP

End Behavior (Right): NONE

