

PreCalculus Honors '15-16
Spring Midterm Part I

Name: _____

Dr. Quattrin

Score _____

CALCULATOR ALLOWED

Round to 3 decimal places. Show all work.

1. Let f be a differentiable function such that $f(3)=2$ and $f'(3)=5$. If the tangent line to the graph of f at $x=3$ is used to find an approximation of a zero of f , that approximation is

- a) 0.4
 - b) 0.5
 - c) 2.6
 - d) 3.4
 - e) 5.5
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2. A railroad track and a road cross at right angles. An observer stands on the road 70 meters south of the crossing and watches an eastbound train traveling at 60 meters per second. At how many meters per second is the train moving away from the observer 4 seconds after it passes through the intersection?

- a) 57.60
 - b) 57.88
 - c) 59.20
 - d) 60.00
 - e) 67.40
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3. An equation of the tangent line to curve $x^2 + y^2 = 169$ at the point $(5, -12)$ is

a) $5y - 12x = -120$

b) $5x - 12y = 119$

c) $5x - 12y = 169$

d) $12x + 5y = 0$

e) $12x + 5y = 169$

4. Let m and b be real numbers and let $f(x) = \begin{cases} 1 + 3bx + 2x^2 & \text{if } x \leq 1 \\ mx + b & \text{if } 1 < x \end{cases}$. If f is continuous and differentiable at $x = 1$, then

a) $m = 1, b = 1$

b) $m = 1, b = -1$

c) $m = -1, b = 1$

d) $m = -1, b = -1$

e) None of these

5. Let $f(x) = \begin{cases} \frac{x^2-4}{x-2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2 \end{cases}$. Which of the following statements about f are true?

I. f has a limit at $x = 2$. II. f is continuous at $x = 2$.

III. f is differentiable at $x = 2$.

- a) I only b) II only c) III only
d) I and II only e) I, II, and III
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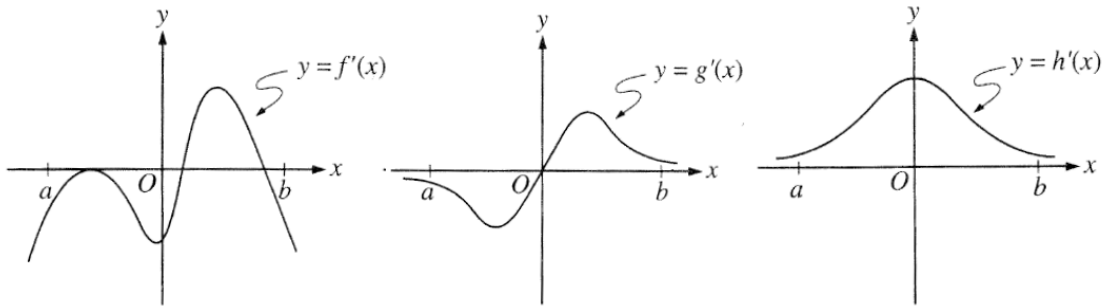
6. If $\frac{d}{dx}[f(x)] = g(x)$ and if $h(x) = x^2$, then $\frac{d}{dx}[f(h(x))]$ =

- a) $g(x^2)$
b) $2xg(x)$
c) $g'(x)$
d) $2xg(x^2)$
e) $x^2g(x^2)$
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7. Find the domain of the following function $f(x) = \frac{\sqrt{x+5}}{x^2-x-72}$.

- a) $x \in (-\infty, -8) \cup (-8, -5) \cup (-5, 9) \cup (9, \infty)$
b) $x \in [-5, 9) \cup (9, \infty)$
c) $x \in (0, \infty)$
d) $x \in (-\infty, -8) \cup [-5, 9) \cup (9, \infty)$
e) $x \in (-\infty, \infty)$
-

8. The graphs of the **derivatives** of the functions f , g , and h are shown below. Which of the functions f , g , or h have a relative maximum on the open interval (a, b) ?



- a) f only b) g only c) h only
 d) f and g only e) f , g , and h

9. If g is a differentiable function such that $g(x) < 0$ for all real numbers x and if $f'(x) = (x^2 - 4)g(x)$, which of the following is true?

- a) f has a relative maximum at $x = -2$ and a relative minimum at $x = 2$.
 b) f has a relative minimum at $x = -2$ and a relative maximum at $x = 2$.
 c) f has a relative minima at $x = -2$ and $x = 2$.
 d) f has a relative maxima at $x = -2$ and $x = 2$.
 e) It cannot be determined if f has any relative extremes.

10. Given the functions $f(x)$ and $g(x)$ that are both continuous and differentiable, and that have values given on the table below.

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
2	4	-2	8	1
4	10	8	4	3
8	6	-12	2	4

Given that $h(x) = f(x) \cdot g(x)$, $h'(8) =$

- a) 0 b) 62 c) 12 d) -12 e) -48

CALCULATOR ALLOWED

Round to 3 decimal places. Show all work.

$$1. h(x) = \begin{cases} \frac{4-x^2}{4x^2-25}, & \text{if } -4 \leq x < -2 \\ 3, & \text{if } x = -2 \\ -\frac{1}{2}x+1, & \text{if } -2 < x \leq 2 \\ \sqrt{\frac{x-2}{4+x^2}}, & \text{if } 2 < x \end{cases}$$

i) Is $h(x)$ continuous at $x=2$? Why or why not?

ii) Is it differentiable at $x=2$? Why or why not?

2. Find the Domain and Extreme points of $g(x) = \sqrt{\frac{x^2 - 4x + 4}{2x^3 - 5x^2 + x + 2}}$. Show the algebra and calculus to support your answers.

Domain: _____

Extreme Points: _____

NO CALCULATOR ALLOWED

1. Sketch $h(x) = \begin{cases} \frac{4-x^2}{4x^2-25}, & \text{if } -4 \leq x < -2 \\ 3, & \text{if } x = -2 \\ -\frac{1}{2}x+1, & \text{if } -2 < x \leq 2 \\ \sqrt{\frac{x-2}{4+x^2}}, & \text{if } 2 < x \end{cases}$ and state the Traits listed.

Provide proof for the extreme points.

Domain:

Range:

Zeros:

Y-int:

VAs:

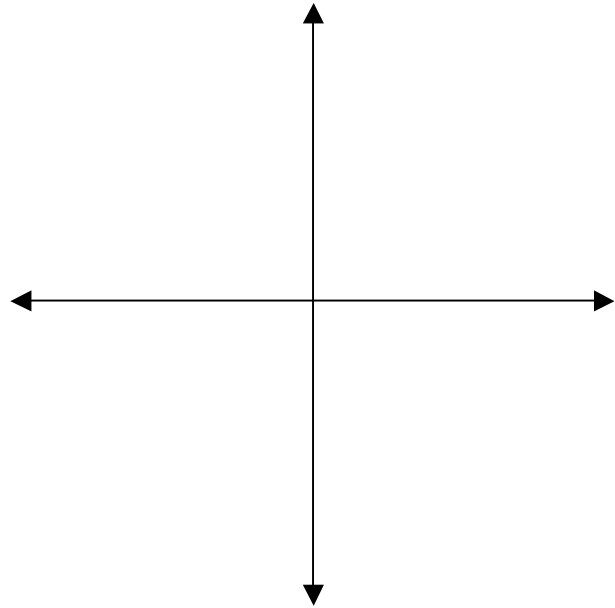
EB (Left):

EB (Right):

Discontinuities:

x-values of non-differentiability:

Extreme Points:



2. List all traits and **sketch** $g(x) = \sqrt{\frac{x^2 - 4x + 4}{2x^3 - 5x^2 + x + 2}}$.

Domain:

Zeros:

y-Int:

VAs:

POEs:

EB:

Extreme Points:

Range:

