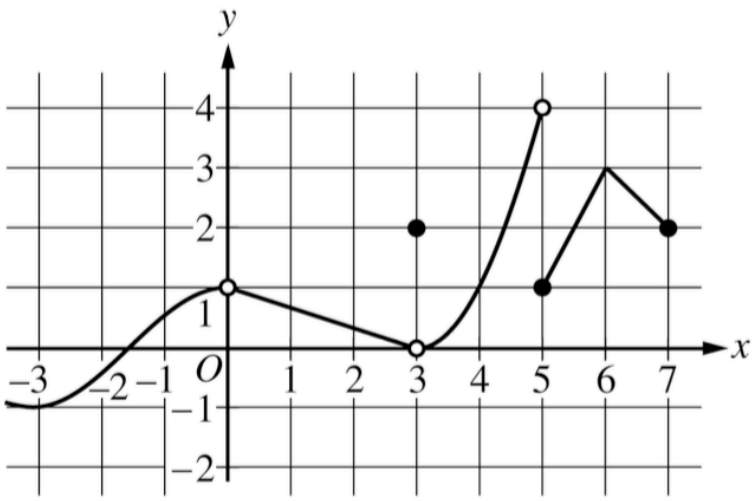
Honors PreCalculus '16-17 Name:_____
Piece-Wise Defined Functions Test
Dr. Quattrin
Calculator allowed

1. The function f is defined on the interval $x \in (-4, 7)$ and has the graph shown below.



Graph of f

For which of the following statements are **false**?

I. $\lim_{x \to 5^+} f(x) = 4$.
II. f is differentiable at $x = 6$.
III. f has a local maximum at $x = 3$.

(a) I only (b) II only (c) III only

(d) I and II only (e) I and III only

2. The end behavior of $g(x)=\sqrt{\frac{x^2-9}{x^2+4}}$

a) $y=0$ on both ends
b) $y=1$ on the left and none on the right
c) $y=1$ on the left and none on the right
d) $y=1$ on both ends
e) None on the left and $y=0$ on the right

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3. The function f is defined on all the Reals such that $f(x)=\begin{cases} x^2+kx-3 & \text{for } x\le 1 \\ 3x+b & \text{for } x>1 \end{cases}$. For which values of k and b will the function be continuous and differentiable throughout its domain?

a) $k=-1$ and $b=-3$
b) $k=1$ and $b=3$
c) $k=1$ and $b=4$
d) $k=1$ and $b=-4$
e) $k=-1$ and $b=6$

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4. Let $f(x)=\begin{cases} -x+5, & \text{if } x<-2 \\ x^2+3, & \text{if } -2\le x\le 1 \\ 2x^3, & \text{if } 1<x \end{cases}$. Which of the following statements is **false** about f?

I. f is continuous at $x = -2$.
II. f is differentiable at $x = 1$.
III. f has a local minimum at $x = -2$.

(a) I only (b) II only (c) III only

(d) I and III only (e) II and III only

5. If the derivative of the function f is $f'(x)=-3(x+2)^4(x+1)(x-3)^3$, then f has a local minimum at $x=$

(a) -2 only (b) -1 only (c) 3 only (d) -2 and 3 (e) -1 and 3

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6. Let f be defined by $f(x)=\begin{cases} 4x^2+10, & \text{if } x<1 \\ mx^3+8, & \text{if } 1<x \end{cases}$. Determine the value of m for which is continuous for all real x.

a) -6 b) -2 c) 8 d) 14 e) None of these

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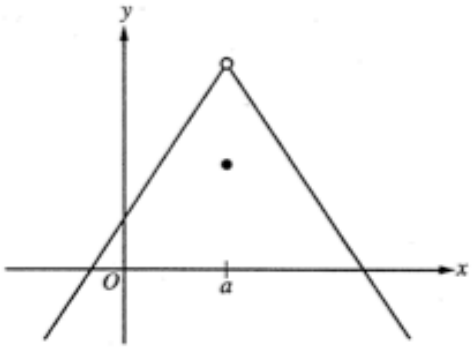
7. The graph of the function $f(x)$ is shown below. Which of the following statements **must** be false?

a) $f(a)$ exists.
b) $f(x)$ is defined for $0<x<a$
c) $f(x)$ is not continuous at $x=a$.
d) $\lim_{x\to a} f(x)$ exists.
e) $\lim_{x\to a} f'(x)$ exists.



Graph of f

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8. A function $f(x)$ has a vertical asymptote at $x = 2$. The derivative of $f(x)$ is positive for all $x \neq 2$. Which of the following statements are true?

I. $\lim_{x \to 2} f(x) = +\infty$ II. $\lim_{x \to 2^-} f(x) = +\infty$ III. $\lim_{x \to 2^+} f(x) = +\infty$

(a) I only (b) II only (c) III only

(d) I and II only (e) I, II and III

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1. $$h(x)=\begin{cases}2-x, & \text{if } x<-2\\ 3, & \text{if } x=-2\\ \sqrt{3x^2+4}, & \text{if } -2<x<0\\ 5-x, & \text{if } 0\le x<3\\ 3x-7, & \text{if } x\ge 3\end{cases}$$

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

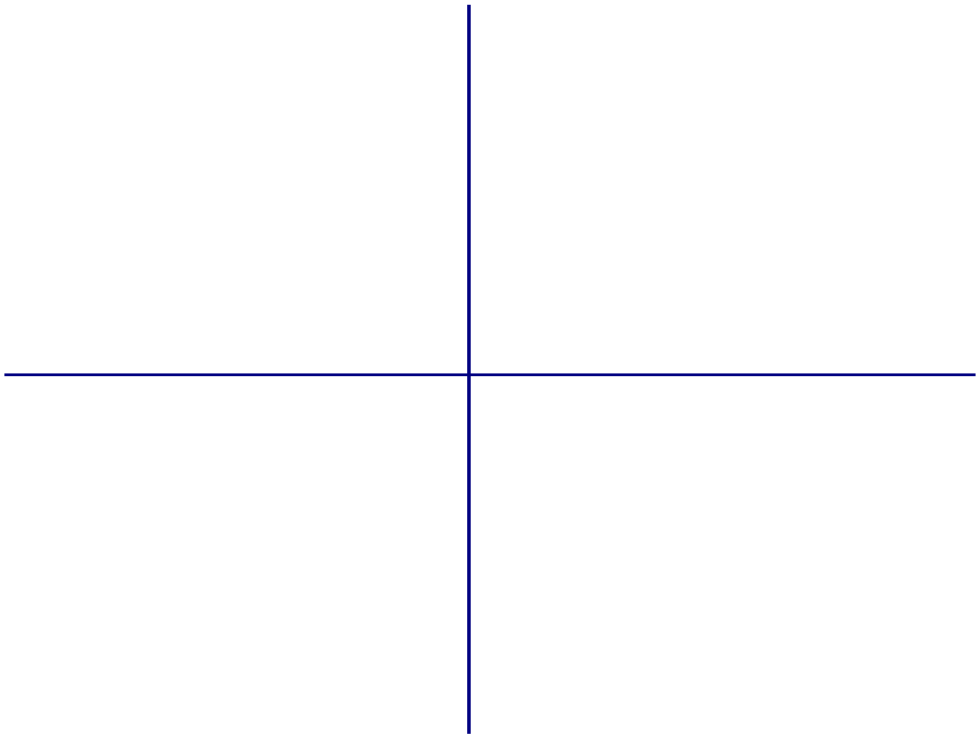
ii) Is it differentiable at $x=-2$? Why or why not?

2. $h(x)=\begin{cases} 2-x, & \text{if } x<-2 \\ 3, & \text{if } x=-2 \\ \sqrt{3x^2+4}, & \text{if } -2<x<0 \\ 5-x, & \text{if } 0\le x<3 \\ 3x-7, & \text{if } x\ge 3 \end{cases}$

i) Is $h(x)$ continuous at $x=3$? Why or why not?

ii) Is it differentiable at $x=3$? Why or why not?

3. Sketch $h(x)=\begin{cases} 2-x, & \text{if } x<-2 \\ 3, & \text{if } x=-2 \\ \sqrt{3x^2+4}, & \text{if } -2<x<0 \\ 5-x, & \text{if } 0\le x<3 \\ 3x-7, & \text{if } x\ge 3 \end{cases}$. State the Traits listed. Provide proof for the extreme points.



Domain: Range:

Zeros: Y-int:

VAs:

EB (Left): EB (Right):

Discontinuities:

Points of non-differentiability:

Extreme Points: