

12 DAYS OF CALCULUS!

NAME _____ PER _____ DATE _____

Part I: Multiple Choice: No Calculator

1) If $f(x) = \frac{x^2-9}{x+3}$ has a removable discontinuity at $x = -3$, then $f(-3) =$

- 3
- 3
- 0
- 6
- 6

2) $\lim_{x \rightarrow \infty} \frac{10^8 x^5 + 10^6 x^4 + 10^4 x^2}{10^9 x^6 + 10^7 x^5 + 10^5 x^3} =$

- 0
- 1
- 1
- $\frac{1}{10}$
- $-\frac{1}{10}$

3) If $f(x) = \sqrt{4 \sin 2x + 2}$, then $f'(0) =$

- 2
- 0
- $\sqrt{2}$
- $2\sqrt{2}$
- 1

4) Let f and g be differentiable functions such that

$$f(1) = 4, g(1) = 3, f'(3) = -5$$

$$f'(1) = -4, g'(1) = -3, g'(3) = 2$$

If $h(x) = f(g(x))$, then $h'(1) =$

-9

15

0

-5

-12

5) What is $\lim_{h \rightarrow 0} \frac{\cos(\frac{\pi}{2} + h) - \cos(\frac{\pi}{2})}{h}$?

-1

$-\frac{\sqrt{2}}{2}$

0

1

The limit does not exist.

6) If $f(x) = \sin^2(3 - x)$, then $f'(0) =$

$-2 \cos 3$

$-2 \sin 3 \cos 3$

$6 \cos 3$

$2 \sin 3 \cos 3$

$6 \sin 3 \cos 3$

7) If $\lim_{x \rightarrow 2} \frac{f(x)}{x-2} = f'(2) = 0$, which of the following must be true?

- I. $f(2) = 0$
- II. $f(x)$ is continuous at $x = 2$
- III. $f(x)$ has a horizontal tangent line at $x = 2$

I only

II only

I and II only

II and III only

I, II, and III

8) If $f(x) = x - 1$ and $g(x) = x^2 + 1$, then $f(g(x)) = g(f(x))$ when $x =$

$-\frac{1}{2}$

$\frac{1}{2}$

-1

1

0

10) What are the asymptotes of $f(x) = \frac{(x-14)^2}{(x+18)(x-14)}$?

horizontal at $y = 0$, no vertical

horizontal at $y = 0$, vertical at $x = -18$

horizontal at $y = 0$, vertical at $x = -18$ and $x = 14$

horizontal at $y = 1$, vertical at $x = -18$

horizontal at $y = 1$, vertical at $x = -18$ and $x = 14$

Part II: Multiple Choice: Calculators Are Allowed

11) The equation of the tangent line to the curve $x^2 + y^2 = 169$ at the point $(5, -12)$ is

$5y - 12x = -120$

$5x - 12y = 119$

$5x - 12y = 169$

$12x + 5y = 0$

$12x + 5y = 169$

Part III: Free Response: No Calculators

1) Let f be the function given by $f(x) = \frac{x}{\sqrt{x^2 - 4}}$

- Find the domain of f . (Write your answer in interval notation.)
- Write an equation for each vertical asymptote to the graph of f .
- Write an equation for each horizontal asymptote to the graph of f .
- Find $f'(x)$.

Part IV: Free Response: Calculator Portion

3) Let f be a function defined by $f(x) = \begin{cases} 1 - 2 \sin x & \text{for } x \leq 0 \\ 3 \cos x - 2 & \text{for } x > 0. \end{cases}$

a) Show that f is continuous at $x = 0$.

b) For $x \neq 0$, express $f'(x)$ as a piecewise-defined function.