

Show your work for part I and II.

Part I – Multiple choices (correct answer: 3 pts, explanation: 2 pts)

1. If $\begin{cases} f(x) = \frac{\sqrt{2x+12}-\sqrt{x+14}}{x-2}, & \text{for } x \neq 2 \\ f(2) = k \end{cases}$ and if f is continuous at $x = 2$, then $k =$

- a) 0 b) $\frac{1}{8}$ c) $\frac{1}{6}$ d) $\frac{1}{4}$ e) 1

2. $\lim_{n \rightarrow \infty} \frac{2n^2 + 1000n}{3n^2}$ is

- a) Infinity b) 0 c) 2 d) $\frac{2}{3}$ e) 1000

3. $\lim_{A \rightarrow 0} \frac{1 - \cos A}{2 \sin^2 A}$ is

- a) 0 b) $\frac{1}{8}$ c) $\frac{1}{4}$ d) 1 e) nonexistent
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Part II – Short responses (5 pts each)

Evaluate

4. $\lim_{x \rightarrow 4^+} \frac{-2}{x-4}$

5. $\lim_{x \rightarrow 0} \frac{\tan(3x)}{2x}$

6. $\lim_{x \rightarrow \pi/5} \frac{\sin(5x)}{x}$

7. $\lim_{x \rightarrow 1} \frac{(x-4)^2-9}{x-1}$

8. $\lim_{x \rightarrow 1} \frac{\frac{1}{x+1} - \frac{1}{2}}{x-1}$

9. $\lim_{x \rightarrow \infty} \frac{\sin(10x)}{x-4}$

10. $\lim_{x \rightarrow -\infty} \frac{\sqrt{x^2-3}}{-2x}$

Part III – long response (12 pts each)

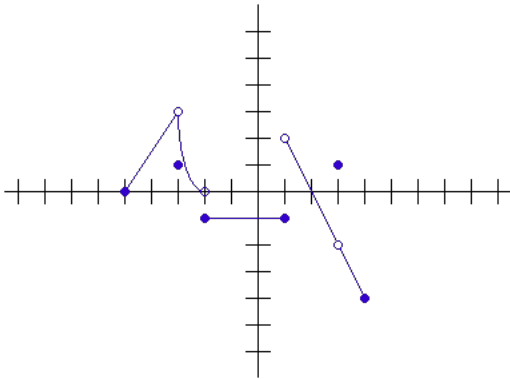
11. Evaluate $f'(3)$ for $f(x) = 2x^2 - x$

12. Let $f'(a) = \lim_{h \rightarrow 0} \frac{\sqrt{4+h}-2}{h}$.

- a. What is $f(x)$?
- b. What is the value of a ?
- c. Evaluate the given limit.

13. Let $f(x) = \begin{cases} 3x - k, & x \leq 2 \\ x^2 + 1, & x > 2 \end{cases}$. If $f(x)$ is continuous at $x = 2$. Find the value of k . Justify.

14. Evaluate based on the graph, $y = f(x)$ below. Each marker represents one unit.



a. $\lim_{x \rightarrow -3} f(x)$

b. $\lim_{x \rightarrow 1} f(x)$

c. $f(3)$

d. $\lim_{x \rightarrow 4^-} f(x)$