Math 131 - Quiz 3

Name _____

February 4, 2026

Score _____

Show all work to receive full credit. Supply explanations when necessary.

1. (5 points) Determine each limit analytically.

   (a) $\lim_{x\to 4} \dfrac{x(4-x)}{2-\sqrt{x}}$

   (b) $\lim_{x\to 0} \dfrac{\sin 5x}{x}$

2. (4 points) Determine each limit below analytically or explain why it does not exist.

$$f(x) = \begin{cases} x^2 - 5x + 6, & x < 2 \\ x^3 - 1, & x > 2 \end{cases}$$

   (a) $\lim_{x\to 2^+} f(x)$

   (b) $\lim_{x\to 2^-} f(x)$

   (c) $\lim_{x\to 2} f(x)$

   (d) $\lim_{x\to 1} f(x)$

3. (1 point) Suppose that $\dfrac{1}{2} - \dfrac{x^2}{24} < \dfrac{1-\cos x}{x^2} < \dfrac{1}{2}$ for values of x close to $x = 0$.

   What can you say about the limit below? What is the name of the theorem you used?

$$\lim_{x\to 0} \frac{1-\cos x}{x^2}$$