

Class Test

1. If $f(x) = \sqrt{x}$ and $g(x) = \sin x$, find the functions (a) $f \circ g$, (b) $g \circ f$, (c) $f \circ f$, (d) $g \circ g$, and their **domains**.

2. If $f(x) = x^2 - 2x + 3$, evaluate the difference quotient.

$$\frac{f(a+h) - f(a)}{h}$$

3. Suppose that the graph of f is given. Describe how the graphs of the following functions can be obtained from the graph of f .

(a) $y = 1 + 2f(x)$,

(b) $y = f(x - 2) - 2$

4. Calculating Limits

$$(1) \lim_{t \rightarrow 2} \frac{t^2 - 4}{t^3 - 8}$$

$$(3) \lim_{x \rightarrow 4^+} \frac{4 - x}{|4 - x|}$$

$$(5) \lim_{x \rightarrow \infty} \frac{\tan^{-1} x}{x}$$

$$(2) \lim_{x \rightarrow 3} \frac{\sqrt{x+6} - x}{x^3 - 3x^2}$$

$$(4) \lim_{x \rightarrow 1} \left(\frac{1}{x-1} + \frac{1}{x^2 - 3x + 2} \right)$$

$$(6) \lim_{x \rightarrow \infty} \frac{\ln(1+x^m)}{\ln(1+x^n)}$$

5. Find the values a and b that make f continuous everywhere

$$f(x) = \begin{cases} \frac{x^2 - 4}{x - 2}, & \text{if } x < 2 \\ ax^2 - bx + 3, & \text{if } 2 \leq x < 3 \\ 2x - a + b, & \text{if } x \geq 3 \end{cases}$$

6. Let

$$f(x) = \begin{cases} \sqrt{-x}, & \text{if } x < 0 \\ 3 - x, & \text{if } 0 \leq x < 3 \\ (x - 3)^2, & \text{if } x > 3 \end{cases}$$

(a) Evaluate each limit, if it exists.

(i) $\lim_{x \rightarrow 0^+} f(x)$

(ii) $\lim_{x \rightarrow 0^-} f(x)$

(iii) $\lim_{x \rightarrow 0} f(x)$

(iv) $\lim_{x \rightarrow 3^+} f(x)$

(v) $\lim_{x \rightarrow 3^-} f(x)$

(vi) $\lim_{x \rightarrow 3} f(x)$

(b) Where is f discontinuous? State their types of discontinuity and explain.