

- On an 8×8 checkerboard, how many different squares can be made using an odd number of 1×1 squares?
- Graph $f(x) = \begin{cases} x^3, & x \neq 1 \\ 0, & x = 1. \end{cases}$
 - Find $\lim_{x \rightarrow 1^-} f(x)$ and $\lim_{x \rightarrow 1^+} f(x)$.
 - Does $\lim_{x \rightarrow 1} f(x)$ exist? If so, what is it? If not, why not?
- Determine the following limits.
 - $\lim_{x \rightarrow 0} 6x^2(\cot x)(\csc 2x)$
 - $\lim_{x \rightarrow 0} \frac{\sin 5x}{\sin 4x}$
- Find the limits of each of the following as $x \rightarrow \infty$ and $x \rightarrow -\infty$.
 - $f(x) = \frac{2x^3 + 7}{x^3 - x^2 + x + 7}$
 - $f(x) = \frac{3x + 7}{x^2 - 2}$
- Find where f is continuous.
 - $f(x) = \frac{3x - 5}{2x^2 - x - 3}$
 - $f(x) = \frac{x^2 - 9}{x - 3}$
 - $f(x) = \frac{x}{x^2 + 1}$
 - $f(x) = \sqrt{2x - 3} + x^2$
 - $f(x) = \frac{x}{\sqrt[3]{x - 4}}$
- Let f and g be functions which are discontinuous at c . Give examples to show the following.
 - $f + g$ can be continuous at c .
 - $f + g$ can be discontinuous at c .
 - fg can be continuous at c .
 - fg can be discontinuous at c .

7. For each of the following functions, **explain** where the function is continuous, continuous from the right, continuous from the left, and discontinuous. Also, sketch the graph of the function.

$$(a) f(x) = \begin{cases} \frac{1}{x} & \text{if } x < -1 \\ x & \text{if } -1 \leq x \leq 1 \\ \frac{1}{x^2} & \text{if } x > 1 \end{cases}$$

$$(b) g(x) = \begin{cases} -\frac{1}{(x-1)^2} & \text{if } x < 1 \\ 0 & \text{if } x = 1 \\ \frac{x^2-1}{x+1} & \text{if } x > 1 \end{cases}$$

8. Find the slopes of the tangent lines to the following functions at the points with x -coordinates -1 and $2/3$.

(a) $f(x) = 5x - 2$

(b) $g(x) = x^2$

9. Find the equation of the tangent line to the curve $g(x) = \frac{1}{x}$ at the point with x -coordinate $x = -1$. Graph the function and the tangent line on the same coordinate axes.

10. Find all values of a for which the tangent line to

$$f(x) = x^2 - 2x + 3$$

at $(a, f(a))$ is horizontal.

11. If an arrow is shot upward on the moon with a velocity of 58 m/s, its height(in meters) after t seconds is given by $h(t) = 58t - 0.83t^2$.

(a) Find the velocity of the arrow after 1 s.

(b) Find the velocity of the arrow when $t = a$.

(c) When will the arrow hit the moon?

(d) With what velocity will the arrow hit the moon?