

Review for Test – Limits

No Calculator!

Find the limit (if it exists).

1) $\lim_{x \rightarrow 4} \sqrt{x+2}$

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

3) $\lim_{x \rightarrow -5} \frac{x^3+125}{x+5}$

4) $\lim_{x \rightarrow \frac{\pi}{4}} \frac{4x}{\tan x}$

5) $\lim_{x \rightarrow 1^-} g(x)$, where $g(x) = \begin{cases} \sqrt{1-x}, & x \leq 1 \\ x+1, & x > 1 \end{cases}$

6) $\lim_{t \rightarrow 1} h(t)$, where $h(t) = \begin{cases} t^3+1, & t < 1 \\ \frac{1}{2}(t+1), & t \geq 1 \end{cases}$

Determine the intervals on which the function is continuous.

7) $f(x) = \begin{cases} 5-x, & x \leq 2 \\ 2x-3, & x > 2 \end{cases}$

8) $f(x) = \frac{1}{(x-2)^2}$

9) Determine the value of c such that the function is continuous on the entire real line.

$$f(x) = \begin{cases} x+3, & x \leq 2 \\ cx+6, & x > 2 \end{cases}$$

10) Use the Intermediate Value Theorem to show that $f(x) = 2x^3 - 3$ has a zero in the interval $[1, 2]$.

Find the vertical asymptotes (if any) of the graphs of the function.

11) $f(x) = \frac{8}{(x-10)^2}$

12) $g(x) = \frac{x^2-49}{x-7}$

Find the one-sided limit.

13) $\lim_{x \rightarrow -2^-} \frac{2x^2+x+1}{x+2}$

14) $\lim_{x \rightarrow -1^+} \frac{x+1}{x^3+1}$

Find the limit.

15) $\lim_{x \rightarrow \infty} \frac{2x^2}{3x^2+5}$

16) $\lim_{x \rightarrow \infty} \frac{2x}{3x^2+5}$

17) $\lim_{x \rightarrow -\infty} \frac{3x^2}{x+5}$

Find any vertical and horizontal asymptotes of the graph of the function.

18) $h(x) = \frac{2x+3}{x-4}$

19) $g(x) = \frac{5x^2}{x^2+2}$

20) Let $f(x)$ be a function defined by $f(x) = \begin{cases} \cos x, & x \leq 0 \\ x^2+1, & x > 0 \end{cases}$. Show that $f(x)$ is continuous at $x = 0$. (You must use the 3 step process discussed in the day 2 notes on limits!)

21) The $\lim_{x \rightarrow 4} x^2 - 5x + 9$ is

22) The $\lim_{x \rightarrow 5^-} \frac{x + 5}{x^2 - 25}$ is

23) $\lim_{x \rightarrow 0} \frac{-5x^5 + 3x^3}{x}$ is

24) $\lim_{x \rightarrow \infty} \frac{4x^2 + 16}{x^3 - 64}$ is

25) $\lim_{x \rightarrow \infty} \frac{3 - 5x^2 - 2x^3}{6x^3 + x^2 - 2x + 1}$ is

26) The graph of $f(x) = \frac{ax + 10}{x - b}$ has $x = -5$ and $y = 3$ as asymptotes. What is the value of $a - b$?

27) $\lim_{x \rightarrow \frac{\pi}{4}} (\cos^2 x - 1)$ is

___ 28) The graph of which of the following functions has $y = -2$ as a horizontal asymptote?

a) $f(x) = \frac{|x - 2|}{x + 2}$

b) $f(x) = \frac{x^2}{x^2 - 4}$

c) $f(x) = \frac{x^2 - 4}{2x^2}$

d) $f(x) = \frac{2x^2}{4 - x^2}$

e) $f(x) = \frac{2x^2}{4 + x^2}$

___ 29) Which of the following statements is true for the graph of $f(x) = \frac{3x}{x^3 - 9x}$?

a) $x = 0$, $x = 3$, and $x = -3$ are vertical asymptotes.

b) $y = \frac{1}{3}$ is a horizontal asymptote.

c) $x = 3$ is the only vertical asymptote.

d) The graph of function f has no horizontal asymptote.

e) $x = 3$ and $x = -3$ are vertical asymptotes.

