

Name: _____

Exercise 1 Evaluate the following limits. Show some work or give some justification but you do NOT need to show limit laws.

2.3 ex 10 a. $\lim_{x \rightarrow \infty} \frac{\sin(x)}{x^2 + x - 1}$

ch 2.4 ex 7 d. $\lim_{x \rightarrow \pi} e^{\sin^2(x)}$

2.5 ex 5 b. $\lim_{t \rightarrow -\infty} \frac{3t^4 + 2t - 1}{-5t^4 + 2t^2 - 1}$

ch 2.5 ex 1 e. $\lim_{x \rightarrow 1} \frac{x^2 - x - 6}{x^2 - 4x + 3}$

2.5 ex 1 c. $\lim_{x \rightarrow 3} \frac{x^2 + 2x - 3}{x^2 - 6x + 9}$

ch 3.6 ex 4, ch 2.5 ex 2 f. $\lim_{x \rightarrow (\frac{\pi}{2})^-} \ln\left(\frac{1}{\tan(x)}\right)$

Exercise 2 Let $f(x) = \begin{cases} \frac{(1-x)(x+2)}{x+2} & \text{if } x \leq -1 \\ \frac{1}{x} & \text{if } -1 < x < 1 \\ x^2 - 2x & \text{if } 1 \leq x \end{cases}$.

Evaluate the following and then answer the given questions.

a. i. $\lim_{x \rightarrow -3^-} f(x)$ ii. $\lim_{x \rightarrow -3^+} f(x)$ iii. $f(-3)$

iv. Is f continuous from the left at -3?

vi. Is f continuous at -3?

v. Is f continuous from the right at -3?

vii. If f is discontinuous at -3, what kind of discontinuity is it?

b. i. $\lim_{x \rightarrow -2^-} f(x)$ ii. $\lim_{x \rightarrow -2^+} f(x)$ iii. $f(-2)$

iv. Is f continuous from the left at -2?

vi. Is f continuous at -2?

v. Is f continuous from the right at -2?

vii. If f is discontinuous at -2, what kind of discontinuity is it?

c. i. $\lim_{x \rightarrow -1^-} f(x)$ ii. $\lim_{x \rightarrow -1^+} f(x)$ iii. $f(-1)$

iv. Is f continuous from the left at -1?

vi. Is f continuous at -1?

v. Is f continuous from the right at -1?

vii. If f is discontinuous at -1, what kind of discontinuity is it?

More on next page.

d. i. $\lim_{x \rightarrow 0^-} f(x)$ ii. $\lim_{x \rightarrow 0^+} f(x)$ iii. $f(0)$

iv. Is f continuous from the left at 0?

vi. Is f continuous at 0?

v. Is f continuous from the right at 0?

vii. If f is discontinuous at 0, what kind of discontinuity is it?

e. i. $\lim_{x \rightarrow 1^-} f(x)$ ii. $\lim_{x \rightarrow 1^+} f(x)$ iii. $f(1)$

iv. Is f continuous from the left at 1?

vi. Is f continuous at 1?

v. Is f continuous from the right at 1?

vii. If f is discontinuous at 1, what kind of discontinuity is it?

f. Is f continuous *only* from the right **at** $x = 1$ *or* on the interval $[1, \infty)$?

g. If I ask where f is continuous *only* from the left, is it okay to write $x \leq -1$? Why or why not?

Hint for the last two problems: Parse out the definition of continuity and one sided continuity in chapter 2.4. Pay attention to the word **ONLY** in the above questions.