Limits Exercise 2

Name: _____ Due Date: _____

[47 marks]

Find the limit in each question. Show your work to all questions organized on lined paper for review.

Submit only final answers for questions #1-11 and #16-19 in the online portion of this assignment.

Submit full solutions to #12-15 and the graphs for #16-19 uploaded to the written portion of this assignment. Remember to use proper limit notation until the substitution step.

1. $\lim_{x\to -3} 5$ 5

2. $\lim_{x\to -4} x^4$ 256

3. $\lim_{y\to 0} y^{\frac{3}{5}}$ 0

4. $\lim_{x\to 3^+} (x+2)$ 5

5. $\lim_{x\to -2} (-x^3+2x^2-4x-8)$ 16

6. $\lim_{x\to 1} \frac{x^2-3x+1}{x^2+1}$ $-\frac{1}{2}$

7. $\lim_{y\to 4} (y-5)^{\frac{4}{3}}$ Undefined

8. $\lim_{x\to -5} (x+4)^{2007}$ -1

9. $\lim_{x\to 3^-} \sqrt{3-x}$ 0

10. $\lim_{x\to 0} \frac{2-\sqrt{x+4}}{x}$ $-\frac{1}{4}$

11. $\lim_{x\to 1} (4^x + x^4 + \tan \pi x)$ 5

12. $\lim_{y\to -2} \frac{y+2}{y^2+5y+6}$ 1

13. $\lim_{x\to 25} \frac{\sqrt{x}-5}{x-25}$ $\frac{1}{10}$

14. $\lim_{x\to -6} \frac{x^2-36}{x+6}$ -12

15. $\lim_{x\to -7} \frac{x^2+6x-7}{x+7}$ -8

In questions #16-19 sketch the graphs of the functions and find the indicated limits. If the limit does not exist, explain why, using the symbols ∞ or $-\infty$ where appropriate.

16. $f(x) = \begin{cases} 1, \text{ if } x \le 3 \\ 3, \text{ if } x > 3 \end{cases}$

(a) $\lim_{x\to 3^+} f(x)$ (b) $\lim_{x\to 3^-} f(x)$ (c) $\lim_{x\to 3} f(x)$

(d) $\lim_{x\to \infty} f(x)$ (e) $\lim_{x\to -\infty} f(x)$

17. $f(x) = \begin{cases} 2x-1, \text{ if } x \le \frac{1}{2} \\ 1, \text{ if } x > \frac{1}{2} \end{cases}$

(a) $\lim_{x\to \frac{1}{2}^+} f(x)$ (b) $\lim_{x\to \frac{1}{2}^-} f(x)$ (c) $\lim_{x\to \frac{1}{2}} f(x)$

(d) $\lim_{x\to \infty} f(x)$ (e) $\lim_{x\to -\infty} f(x)$

18. $f(x) = \begin{cases} x^2+2, \text{ if } x \ge 2 \\ 2, \text{ if } x < 2 \end{cases}$

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

(d) $\lim_{x\to \infty} f(x)$ (e) $\lim_{x\to -\infty} f(x)$

19. $f(x) = \begin{cases} -1, \text{ if } x \ge -1 \\ 4x+3, \text{ if } x < -1 \end{cases}$

(a) $\lim_{x\to -1^+} f(x)$ (b) $\lim_{x\to -1^-} f(x)$ (c) $\lim_{x\to -1} f(x)$

(d) $\lim_{x\to \infty} f(x)$ (e) $\lim_{x\to -\infty} f(x)$

12) $\lim_{y \to -2} \left(\frac{y+2}{y^2+5y+6} \right) = \frac{0}{0}$ Ambiguous

$= \lim_{y \to -2} \left(\frac{y+2}{(y+2)(y+3)} \right)$

$= \lim_{y \to -2} \left(\frac{1}{y+3} \right)$

$= \frac{1}{-2+3}$

$= \frac{1}{1}$

$= 1$

13) $\lim_{x \to 25} \left(\frac{\sqrt{x}-5}{x-25} \right) = \frac{0}{0}$ Ambiguous

$= \lim_{x \to 25} \left(\frac{\sqrt{x}-5}{(\sqrt{x}-5)(\sqrt{x}+5)} \right)$

$= \lim_{x \to 25} \left(\frac{1}{\sqrt{x}+5} \right)$

$= \frac{1}{\sqrt{25}+5}$

$= \frac{1}{5+5}$

$= \frac{1}{10}$

14) $\lim_{x \to -6} \left(\frac{x^2-36}{x+6} \right) = \frac{0}{0}$ Ambiguous

$= \lim_{x \to -6} \left(\frac{(x+6)(x-6)}{x+6} \right)$

$= \lim_{x \to -6} (x-6)$

$= -6-6$

$= -12$

15) $\lim_{x \to -7} \left(\frac{x^2+6x-7}{x+7} \right) = \frac{0}{0}$ Ambiguous

$= \lim_{x \to -7} \left(\frac{(x+7)(x-1)}{x+7} \right)$

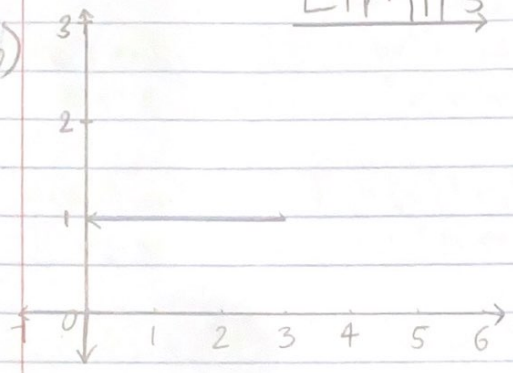
$= \lim_{x \to -7} (x-1)$

$= -7-1$

$= -8$

Limits Exercise 2

16)



a) $\lim_{x \to 3^+} f(x) = 3$

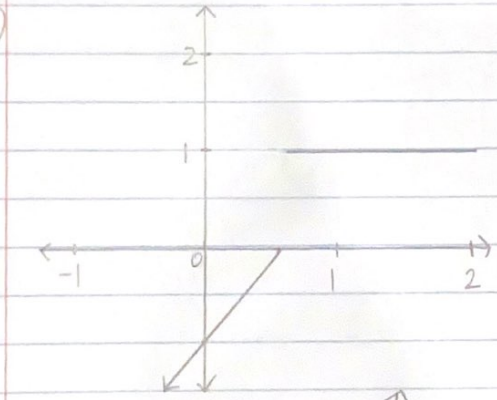
b) $\lim_{x \to 3^-} f(x) = 1$

c) $\lim_{x \to 3} f(x) =$

d) $\lim_{x \to \infty} f(x) = 3$

e) $\lim_{x \to -\infty} f(x) = 1$

17)



a) $\lim_{x \to \frac{1}{2}^+} f(x) = 1$

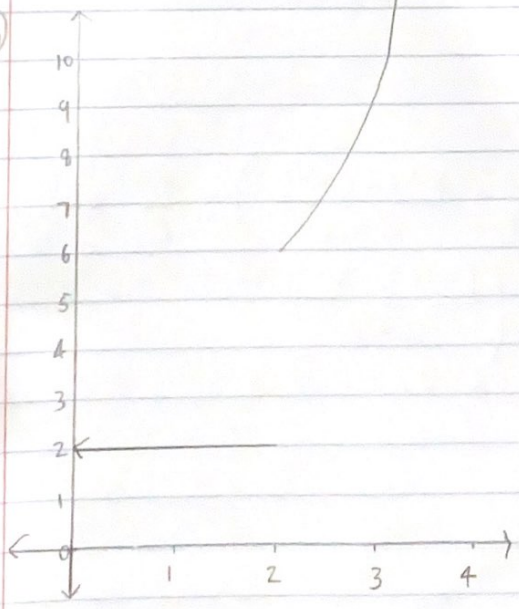
b) $\lim_{x \to \frac{1}{2}^-} f(x) = 0$

c) $\lim_{x \to \frac{1}{2}} f(x) =$

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

e) $\lim_{x \to -\infty} f(x) = -\infty$

18)



a) $\lim_{x \to 2^+} f(x) = 6$

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

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

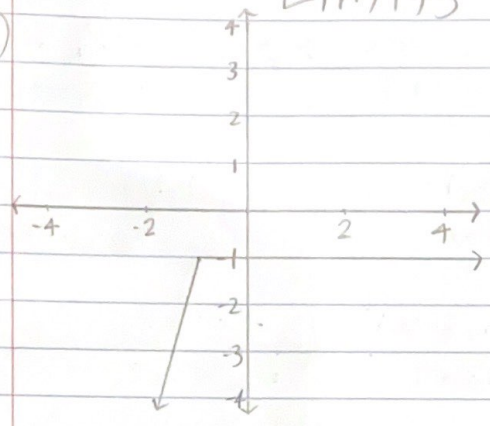
d) $\lim_{x \to \infty} f(x) = \infty$

e) $\lim_{x \to -\infty} f(x) = 2$

Lesson 2

Limits Exercise 2

19)



a) $\lim_{x \to -1^+} f(x) = -1$

b) $\lim_{x \to -1^-} f(x) = -1$

c) $\lim_{x \to -1} f(x) = -1$

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

e) $\lim_{x \to -\infty} f(x) = -\infty$