

Name _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the problem.

1) If $\lim_{x \rightarrow 0} f(x) = L$, which of the following expressions are true?

1) _____

I. $\lim_{x \rightarrow 0^-} f(x)$ does not exist.II. $\lim_{x \rightarrow 0^+} f(x)$ does not exist.III. $\lim_{x \rightarrow 0^-} f(x) = L$ IV. $\lim_{x \rightarrow 0^+} f(x) = L$

A) I and IV only

B) I and II only

C) III and IV only

D) II and III only

2) What conditions, when present, are sufficient to conclude that a function $f(x)$ has a limit as x approaches some value of a ?

2) _____

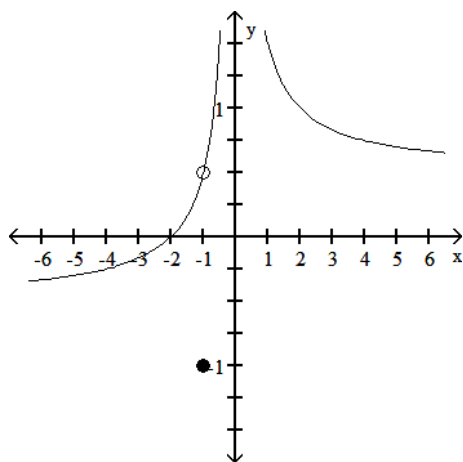
A) The limit of $f(x)$ as $x \rightarrow a$ from the left exists, the limit of $f(x)$ as $x \rightarrow a$ from the right exists, and these two limits are the same.B) The limit of $f(x)$ as $x \rightarrow a$ from the left exists, the limit of $f(x)$ as $x \rightarrow a$ from the right exists, and at least one of these limits is the same as $f(a)$.C) Either the limit of $f(x)$ as $x \rightarrow a$ from the left exists or the limit of $f(x)$ as $x \rightarrow a$ from the right existsD) $f(a)$ exists, the limit of $f(x)$ as $x \rightarrow a$ from the left exists, and the limit of $f(x)$ as $x \rightarrow a$ from the right exists.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Use the graph to evaluate the limit.

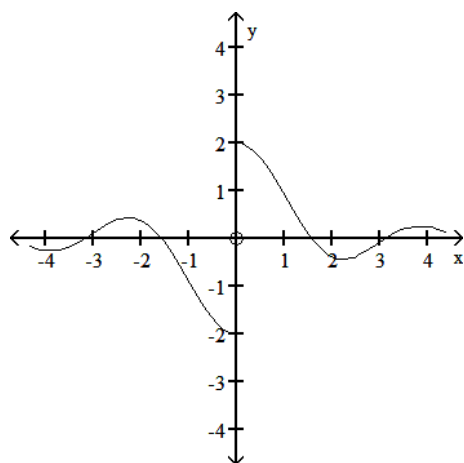
3) $\lim_{x \rightarrow -1} f(x)$

3) _____



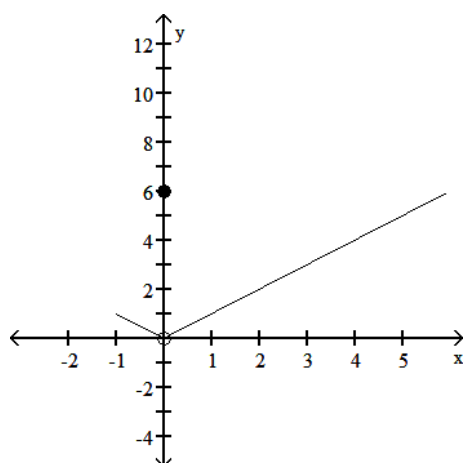
4) $\lim_{x \rightarrow 0} f(x)$

4) _____



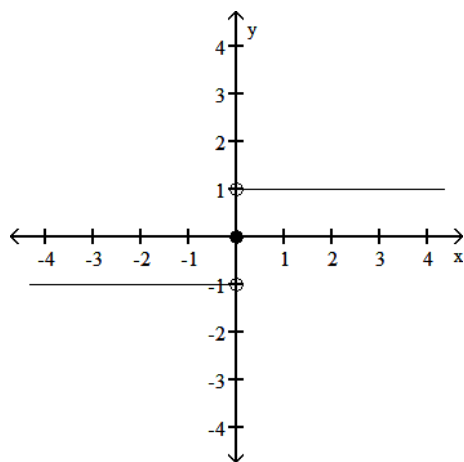
5) $\lim_{x \rightarrow 0} f(x)$

5) _____



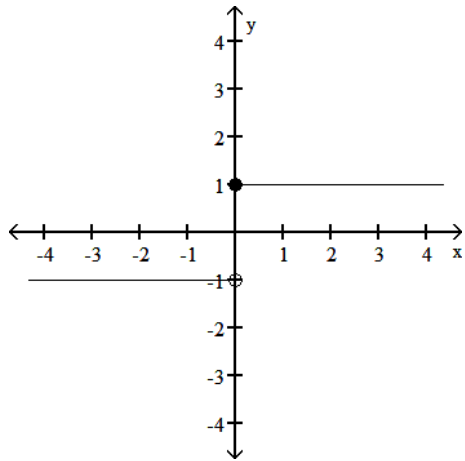
6) $\lim_{x \rightarrow 0} f(x)$

6) _____



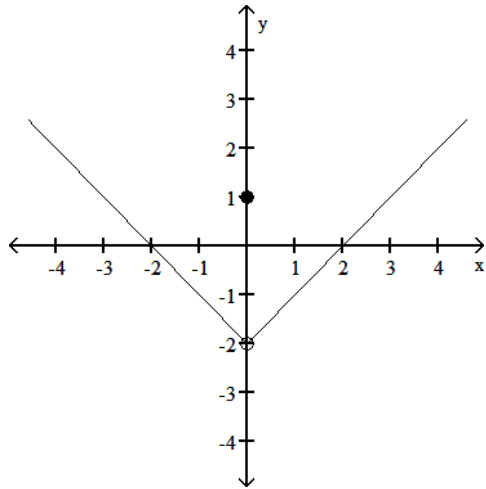
7) $\lim_{x \rightarrow 0} f(x)$

7) _____



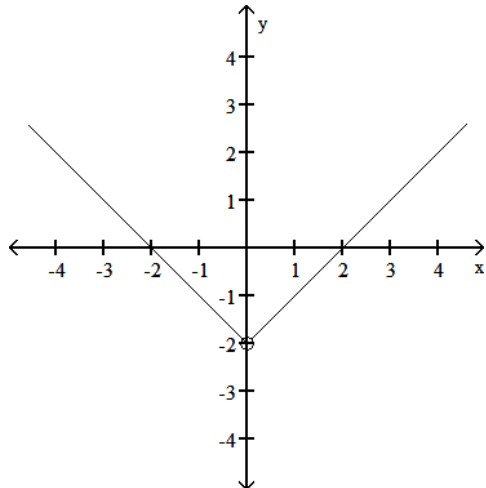
8) $\lim_{x \rightarrow 0} f(x)$

8) _____



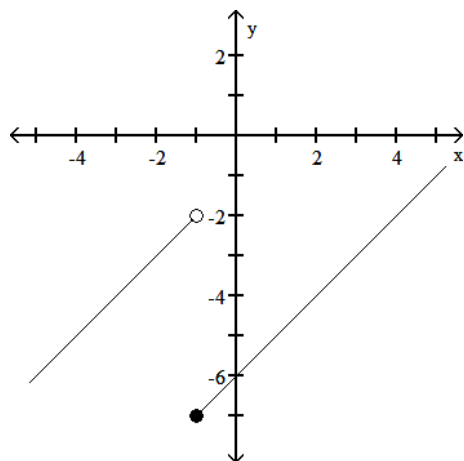
9) $\lim_{x \rightarrow 0} f(x)$

9) _____



10) Find $\lim_{x \rightarrow (-1)^-} f(x)$ and $\lim_{x \rightarrow (-1)^+} f(x)$

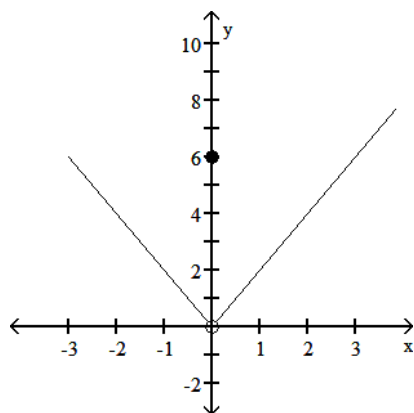
10) _____



Use the graph to evaluate the indicated limit or function value or state that it does not exist.

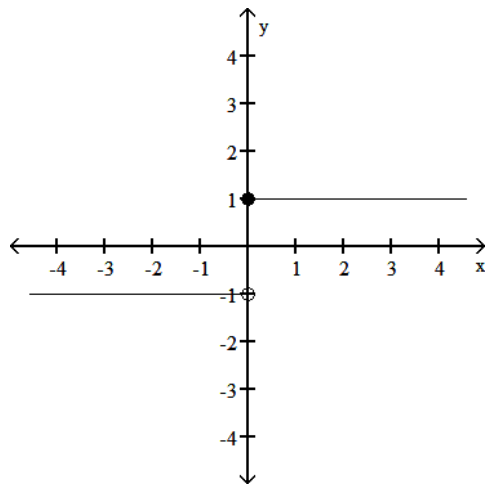
11) Find $\lim_{x \rightarrow 0} f(x)$ and $f(0)$.

11) _____



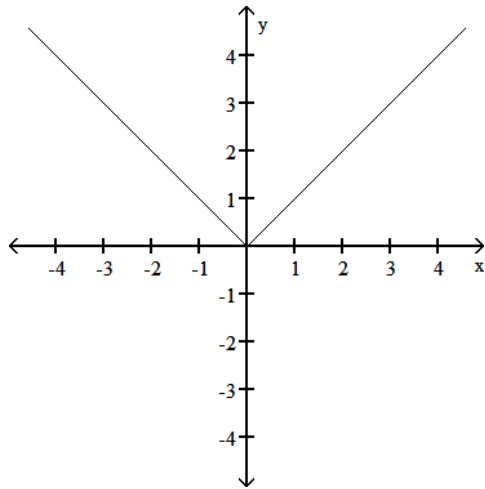
12) Find $\lim_{x \rightarrow 0} f(x)$ and $f(0)$.

12) _____



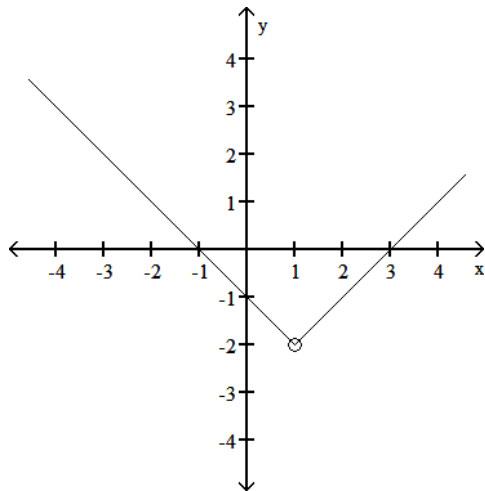
13) Find $\lim_{x \rightarrow 0} f(x)$ and $f(0)$.

13) _____



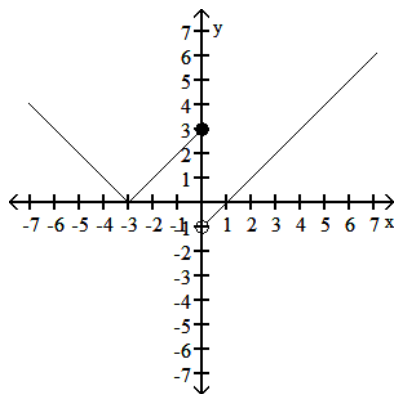
14) Find $\lim_{x \rightarrow 1} f(x)$ and $f(1)$.

14) _____



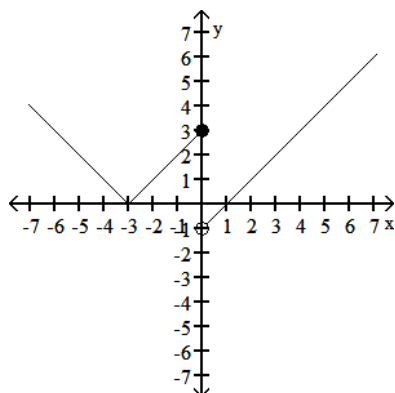
15) Find $\lim_{x \rightarrow 0^-} f(x)$ and $\lim_{x \rightarrow 0^+} f(x)$.

15) _____



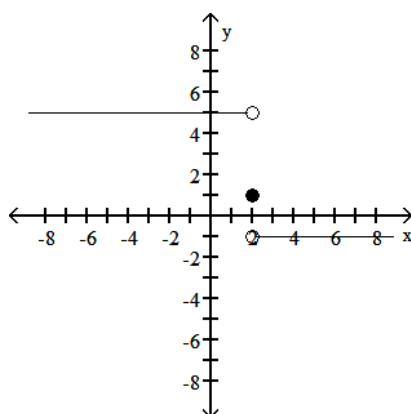
16) Find $\lim_{x \rightarrow 0} f(x)$ and $f(0)$.

16) _____



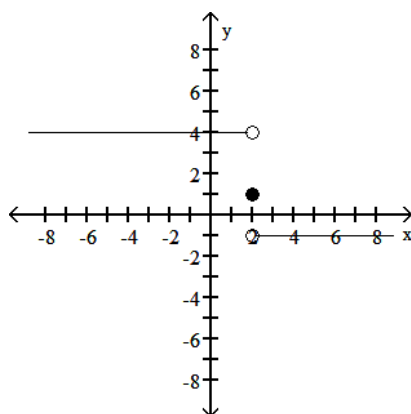
17) Find $\lim_{x \rightarrow 2^-} f(x)$ and $\lim_{x \rightarrow 2^+} f(x)$.

17) _____



18) Find $\lim_{x \rightarrow 2} f(x)$ and $f(2)$.

18) _____



Find the indicated limit.

19) $\lim_{x \rightarrow 8} \frac{x^2 - 64}{x - 8}$

19) _____

$$20) \lim_{x \rightarrow -2} \frac{x^2 + 11x + 18}{x + 2}$$

20) _____

$$21) \lim_{x \rightarrow 5} \frac{x^2 + 3x - 40}{x - 5}$$

21) _____

$$22) \lim_{x \rightarrow 2} \frac{x^2 + 2x - 8}{x^2 - 4}$$

22) _____

$$23) \lim_{x \rightarrow 5} \frac{x^2 - 25}{x^2 - 7x + 10}$$

23) _____

$$24) \lim_{h \rightarrow 0} \frac{(7 + h)^2 - 49}{h}$$

24) _____

Find the limit.

$$25) \lim_{x \rightarrow 1} \frac{3x^2 + 7x - 2}{3x^2 - 4x - 2}$$

25) _____

Find the limit, if it exists.

$$26) \lim_{x \rightarrow 7} \frac{x^2 - 49}{x - 7}$$

26) _____

$$27) \lim_{x \rightarrow 6} \frac{x^2 + 4x - 60}{x - 6}$$

27) _____

$$28) \lim_{x \rightarrow -7} \frac{x^2 + 16x + 63}{x + 7}$$

28) _____

$$29) \lim_{x \rightarrow 6} \frac{x^2 + 4x - 60}{x^2 - 36}$$

29) _____

$$30) \lim_{x \rightarrow 1} \frac{x^2 + 2x - 3}{x^2 - 4x + 3}$$

30) _____

$$31) \lim_{x \rightarrow 5} \frac{x^2 - 25}{x^2 - 7x + 10}$$

31) _____

Find the limit.

$$32) \lim_{x \rightarrow -2} \frac{1}{x + 2}$$

32) _____

$$33) \lim_{x \rightarrow -3^-} \frac{1}{x+3}$$

33) _____

$$34) \lim_{x \rightarrow 3^-} \frac{1}{(x-3)^2}$$

34) _____

$$35) \lim_{x \rightarrow -3^-} \frac{7}{x^2 - 9}$$

35) _____

$$36) \lim_{x \rightarrow 4^+} \frac{1}{x^2 - 16}$$

36) _____

$$37) \lim_{x \rightarrow -6^-} \frac{1}{x+6}$$

37) _____

$$38) \lim_{x \rightarrow 8^-} \frac{x}{x-8}$$

38) _____

$$39) \lim_{x \rightarrow 9^-} \frac{x-9}{|x-9|}$$

39) _____

$$40) \lim_{x \rightarrow 7^+} \frac{x-7}{|x-7|}$$

40) _____

Find the limit or state that it does not exist.

$$41) \lim_{x \rightarrow 7^-} \frac{x^2 - 49}{|x-7|}$$

41) _____

$$42) \lim_{x \rightarrow 3^-} \frac{x-3}{|x-3|}$$

42) _____

$$43) \lim_{x \rightarrow 3} \frac{x-3}{|x-3|}$$

43) _____

$$44) \lim_{x \rightarrow 8} \frac{x^2 - 64}{|x-8|}$$

44) _____

Find the limit.

45) Let $\lim_{x \rightarrow 4} f(x) = -5$ and $\lim_{x \rightarrow 4} g(x) = 7$.

45) _____

Find $\lim_{x \rightarrow 4} [f(x) - g(x)]$.

46) Let $\lim_{x \rightarrow 6} f(x) = -9$ and $\lim_{x \rightarrow 6} g(x) = -5$.

46) _____

Find $\lim_{x \rightarrow 6} [f(x) \cdot g(x)]$.

47) Let $\lim_{x \rightarrow -5} f(x) = 2$ and $\lim_{x \rightarrow -5} g(x) = -4$.

47) _____

Find $\lim_{x \rightarrow -5} \frac{f(x)}{g(x)}$.

48) Let $\lim_{x \rightarrow -7} f(x) = 8$ and $\lim_{x \rightarrow -7} g(x) = -10$.

48) _____

Find $\lim_{x \rightarrow -7} [f(x) + g(x)]^2$.

49) Let $\lim_{x \rightarrow -10} f(x) = 4$ and $\lim_{x \rightarrow -10} g(x) = -1$.

49) _____

Find $\lim_{x \rightarrow -10} \frac{-9f(x) - 10g(x)}{g(x) - 10}$.

Give an appropriate answer.

50) Let $\lim_{x \rightarrow -4} f(x) = -8$ and $\lim_{x \rightarrow -4} g(x) = -5$. Find $\lim_{x \rightarrow -4} [f(x) - g(x)]$.

50) _____

51) Let $\lim_{x \rightarrow 2} f(x) = -10$ and $\lim_{x \rightarrow 2} g(x) = 8$. Find $\lim_{x \rightarrow 2} [f(x) \cdot g(x)]$.

51) _____

52) Let $\lim_{x \rightarrow -5} f(x) = -3$ and $\lim_{x \rightarrow -5} g(x) = 6$. Find $\lim_{x \rightarrow -5} \frac{f(x)}{g(x)}$.

52) _____

Find the limit.

53) $\lim_{x \rightarrow 10^-} \frac{x - 10}{|x - 10|}$

53) _____

54) $\lim_{x \rightarrow 9^+} \frac{x - 9}{|x - 9|}$

54) _____

Find the limit or state that it does not exist.

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

55) _____

56) $\lim_{x \rightarrow 2^-} \frac{x - 2}{|x - 2|}$

56) _____

57) $\lim_{x \rightarrow 5} \frac{x - 5}{|x - 5|}$

57) _____

58) $\lim_{x \rightarrow 3} \frac{x^2 - 9}{|x - 3|}$

58) _____

Find the limit.

59) Let $\lim_{x \rightarrow 10} f(x) = 2$ and $\lim_{x \rightarrow 10} g(x) = -9$.

59) _____

Find $\lim_{x \rightarrow 10} [f(x) - g(x)]$.

60) Let $\lim_{x \rightarrow 6} f(x) = 6$ and $\lim_{x \rightarrow 6} g(x) = -1$.

60) _____

Find $\lim_{x \rightarrow 6} [f(x) \cdot g(x)]$.

61) Let $\lim_{x \rightarrow -2} f(x) = -1$ and $\lim_{x \rightarrow -2} g(x) = 9$.

61) _____

Find $\lim_{x \rightarrow -2} \frac{f(x)}{g(x)}$.

62) Let $\lim_{x \rightarrow 3} f(x) = 4$ and $\lim_{x \rightarrow 3} g(x) = 8$.

62) _____

Find $\lim_{x \rightarrow 3} [f(x) + g(x)]^2$.

63) Let $\lim_{x \rightarrow 8} f(x) = -1$ and $\lim_{x \rightarrow 8} g(x) = -8$.

63) _____

Find $\lim_{x \rightarrow 8} \frac{-9f(x) - 2g(x)}{g(x) + 2}$.

Give an appropriate answer.

64) Let $\lim_{x \rightarrow 9} f(x) = 5$ and $\lim_{x \rightarrow 9} g(x) = -8$. Find $\lim_{x \rightarrow 9} [f(x) - g(x)]$.

64) _____

65) Let $\lim_{x \rightarrow -1} f(x) = -9$ and $\lim_{x \rightarrow -1} g(x) = 2$. Find $\lim_{x \rightarrow -1} [f(x) \cdot g(x)]$.

65) _____

66) Let $\lim_{x \rightarrow 6} f(x) = -9$ and $\lim_{x \rightarrow 6} g(x) = 10$. Find $\lim_{x \rightarrow 6} \frac{f(x)}{g(x)}$. 66) _____

67) Let $\lim_{x \rightarrow 5} f(x) = -2$ and $\lim_{x \rightarrow 5} g(x) = -7$. Find $\lim_{x \rightarrow 5} [f(x) + g(x)]^2$. 67) _____

Determine the points at which the function is discontinuous.

68) $f(x) = \frac{x+8}{(x-7)(x-1)}$ 68) _____

69) $g(x) = \frac{x+4}{x^2-5x+4}$ 69) _____

70) $h(x) = \begin{cases} x^2 - 9 & \text{for } x < -1 \\ 0 & \text{for } -1 \leq x \leq 1 \\ x^2 + 9 & \text{for } x > 1 \end{cases}$ 70) _____

State whether the function is continuous at the indicated point. If it is not continuous, tell why.

71) State whether $r(t)$ is continuous at the point $t = 8$. 71) _____

$$r(t) = \begin{cases} \frac{t^2 - 64}{t - 8} & \text{if } t \neq 8 \\ 16 & \text{if } t = 8 \end{cases}$$

72) State whether $f(t)$ is continuous at the point $t = 8$. 72) _____

$$f(t) = \begin{cases} t^2 - 64 & \text{if } t \leq 8 \\ (t - 8)^2 & \text{if } t > 8 \end{cases}$$

73) State whether $r(t)$ is continuous at the point $t = 4$. 73) _____

$$r(t) = \begin{cases} \frac{t^3 - 64}{t - 4} & \text{if } t \neq 4 \\ 16 & \text{if } t = 4 \end{cases}$$

74) State whether $f(t)$ is continuous at the point $t = 9$. 74) _____

$$f(t) = \begin{cases} 8t - 10 & \text{if } t \neq 9 \\ -17 & \text{if } t = 9 \end{cases}$$

75) State whether $f(t)$ is continuous at the point $t = 6$. 75) _____

$$f(t) = \begin{cases} 7t - 6 & \text{if } t \leq 6 \\ -11 & \text{if } t > 6 \end{cases}$$

Find and simplify the difference quotient of f , $\frac{f(x+h) - f(x)}{h}$, $h \neq 0$, for the function.

76) $f(x) = x^2 + 7x + 2$

76) _____

77) $f(x) = 8x^2$

77) _____

78) $f(x) = 6x^2 + 5x$

78) _____

Find an equation of the tangent line at $x = a$.

79) $y = \frac{x^2}{4}$; $a = -3$

79) _____

80) $y = \frac{x^3}{2}$; $a = 4$

80) _____

81) $y = x^2 - 2$; $a = 2$

81) _____

82) $y = x^2 + 3$; $a = 4$

82) _____

83) $y = x^2 - x$; $a = -3$

83) _____

84) $y = x - x^2$; $a = 4$

84) _____

85) $y = x^3 - 9x + 4$; $a = 3$

85) _____

Answer Key

Testname: TEST1_TAN_SAMPLE_PAPER_MTH271

- 1) C
- 2) A
- 3) $\frac{1}{2}$
- 4) does not exist
- 5) 0
- 6) does not exist
- 7) does not exist
- 8) -2
- 9) -2
- 10) -2; -7
- 11) $\lim_{x \rightarrow 0} f(x) = 0$; $f(0) = 6$
- 12) $\lim_{x \rightarrow 0} f(x)$ Does not exist; $f(0) = 1$
- 13) $\lim_{x \rightarrow 0} f(x) = 0$; $f(0) = 0$
- 14) $\lim_{x \rightarrow 1} f(x) = -2$; $f(1)$ does not exist
- 15) $\lim_{x \rightarrow 0^-} f(x) = 3$; $\lim_{x \rightarrow 0^+} f(x) = -1$
- 16) $\lim_{x \rightarrow 0} f(x)$ Does not exist; $f(0) = 3$
- 17) $\lim_{x \rightarrow 2^-} f(x) = 5$; $\lim_{x \rightarrow 2^+} f(x) = -1$
- 18) $\lim_{x \rightarrow 2} f(x)$ Does not exist; $f(2) = 1$
- 19) 16
- 20) 7
- 21) 13
- 22) $\frac{3}{2}$
- 23) $\frac{10}{3}$
- 24) 14
- 25) $-\frac{8}{3}$
- 26) 14
- 27) 16
- 28) 2
- 29) $\frac{4}{3}$
- 30) -2
- 31) $\frac{10}{3}$
- 32) Does not exist
- 33) $-\infty$
- 34) ∞

Answer Key

Testname: TEST1_TAN_SAMPLE_PAPER_MTH271

- 35) ∞
- 36) ∞
- 37) $-\infty$
- 38) $-\infty$
- 39) -1
- 40) 1
- 41) -14
- 42) -1
- 43) Does not exist
- 44) Does not exist
- 45) -12
- 46) 45
- 47) $-\frac{1}{2}$
- 48) 4
- 49) $\frac{26}{11}$
- 50) -3
- 51) -80
- 52) $-\frac{1}{2}$
- 53) -1
- 54) 1
- 55) -4
- 56) -1
- 57) Does not exist
- 58) Does not exist
- 59)
- 60) -6
- 61) $-\frac{1}{9}$
- 62) 144
- 63) $-\frac{25}{6}$
- 64) 13
- 65) -18
- 66) $-\frac{9}{10}$
- 67) 81
- 68) 7, 1
- 69) 1, 4
- 70) -1, 1
- 71) Continuous
- 72) Continuous
- 73) Not continuous; $\lim_{t \rightarrow 4} r(t)$ and $r(4)$ exist but $\lim_{t \rightarrow 4} r(t) \neq r(4)$
- 74) Not continuous; $\lim_{t \rightarrow 9} f(t)$ and $f(9)$ exist but $\lim_{t \rightarrow 9} f(t) \neq f(9)$

Answer Key

Testname: TEST1_TAN_SAMPLE_PAPER_MTH271

75) Not continuous; $\lim_{t \rightarrow 6} f(t)$ does not exist

76) $2x + h + 7$

77) $8(2x+h)$

78) $12x + 6h + 5$

79) $y = -1.5x - 2.25$

80) $y = 24x - 64$

81) $y = 4x - 6$

82) $y = 8x - 13$

83) $y = -7x - 9$

84) $y = -7x + 16$

85) $y = 18x - 50$