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

Find the domain and graph the function.

1) \( F(x) = \sqrt{-x} \)

1) _____

A) \( D: [0, \infty) \)

B) \( D: (-\infty, 0] \)

C) \( D: (-\infty, 0) \)

D) \( D: (-\infty, \infty) \)
Find the domain and range of the function.

2) \( f(x) = 6 - x^2 \)
   
   A) D: \(( -\infty, \infty),\) R: \(( -\infty, \infty)\)
   
   B) D: \(( -\infty, \infty),\) R: \(( -\infty, 6]\)
   
   C) D: \(( -\infty, \infty),\) R: \([ 6, \infty)\)
   
   D) D: \(( -\infty, 6],\) R: \(( -\infty, \infty)\)

3) \( g(z) = \frac{-10}{\sqrt{z + 1}} \)
   
   A) D: \([1, \infty),\) R: \(( -\infty, \infty)\)
   
   B) D: \([0, \infty),\) R: \(( -\infty, \infty)\)
   
   C) D: \((-\infty,-1),\) R: \((0, \infty)\)
   
   D) D: \((-1, \infty),\) R: \((-\infty,0)\)

Solve the problem.

4) If \( f(x) = \sqrt{x + 3} \) and \( g(x) = 8x - 7,\) find \( f(g(x))\).
   
   A) \( 8\sqrt{x - 4} \)
   
   B) \( 2\sqrt{2x + 1} \)
   
   C) \( 8\sqrt{x + 3} - 7 \)
   
   D) \( 2\sqrt{2x - 1} \)

Express the given function as a composite of functions \( f \) and \( g \) such that \( y = f(g(x))\).

5) \( y = |10x + 8| \)
   
   A) \( f(x) = \lfloor x \rfloor,\) g(x) = \( 10x + 8\)
   
   B) \( f(x) = -\lfloor x \rfloor,\) g(x) = \( 10x + 8\)
   
   C) \( f(x) = x,\) g(x) = \( 10x + 8\)
   
   D) \( f(x) = \lfloor x \rfloor,\) g(x) = \( 10x - 8\)

Graph the function. Determine the symmetry, if any, of the function.

6) \( y = -\frac{1}{x^2} \)

A) Symmetric about the y-axis

B) Symmetric about the y-axis
Solve the problem.

7) A marine biologist determines that the size, p, of a population of crabs, after t days can be modeled by the function \( p(t) = -0.00009t^3 + 0.024t^2 + 10.5t + 1800 \). Assuming that this model continues to be accurate, when will this population become extinct? (Round to the nearest day.)

A) 1512 days  
B) 547 days  
C) 707 days  
D) 911 days

8) For the given function, simplify the expression \( \frac{f(x + h) - f(x)}{h} \).

\( f(x) = 8x - 17 \)

A) 8  
B) -8  
C) 8x  
D) -9

Solve the problem.

9) The accompanying figure shows the graph of \( y = -x^2 \) shifted to a new position. Write the equation for the new graph.

A) \( y = -x^2 + 4 \)  
B) \( y = -(x - 4)^2 \)  
C) \( y = -(x + 4)^2 \)  
D) \( y = -x^2 - 4 \)
Find a formula for the function graphed.

10) A) \(f(x) = \begin{cases} -2, & x \leq 0 \\ \frac{2}{x}, & x > 0 \end{cases}\)  
   B) \(f(x) = \begin{cases} 2x, & x \leq 0 \\ -2x, & x > 0 \end{cases}\)  
   C) \(f(x) = \begin{cases} 2, & x < 0 \\ -2, & x \geq 0 \end{cases}\)  
   D) \(f(x) = \begin{cases} 2, & x \leq 0 \\ -2, & x > 0 \end{cases}\)  

11) A) \(f(x) = \begin{cases} \frac{1}{2}x + 1, & -8 \leq x \leq -2 \\ 5, & -2 < x \leq 3 \\ 6 - x, & 3 < x \leq 8 \end{cases}\)  
   B) \(f(x) = \begin{cases} \frac{1}{2}x + 1, & -8 < x \leq -2 \\ 5, & -2 < x \leq 3 \\ 6 - x, & 3 < x < 8 \end{cases}\)  
   C) \(f(x) = \begin{cases} -\frac{1}{2}x + 1, & -8 \leq x \leq -2 \\ 5, & -2 < x \leq 3 \\ x - 6, & 3 < x \leq 8 \end{cases}\)  
   D) \(f(x) = \begin{cases} \frac{1}{2}x + 1, & -8 \leq x \leq -2 \\ 5, & -2 < x < 3 \\ 6 - x, & 3 \leq x \leq 8 \end{cases}\)  

Graph the function.
12) \( G(x) = \begin{cases} \lfloor x \rfloor - 2, & x < 0 \\ -2, & x \geq 0 \end{cases} \)
Solve the problem.

13) A box with an open top is to be constructed from a rectangular piece of cardboard with dimensions 10 inches by 27 inches by cutting out equal squares of side x at each corner and then folding up the sides as in the figure. Express the volume V of the box as a function of x.

A) \( V(x) = (10 - x)(27 - x) \)  
B) \( V(x) = (10 - 2x)(27 - 2x) \)  
C) \( V(x) = x(10 - 2x)(27 - 2x) \)  
D) \( V(x) = x(10 - x)(27 - x) \)

Find the exact value of the trigonometric function. Do not use a calculator or tables.

14) \( \tan \left( \frac{\pi}{6} \right) \)
A) \( \frac{\sqrt{3}}{2} \)  
B) \( \sqrt{3} \)  
C) \( \frac{\sqrt{3}}{3} \)  
D) 1

15) \( \csc \left( \frac{\pi}{4} \right) \)
A) \( \frac{\sqrt{2}}{2} \)  
B) \( \sqrt{2} \)  
C) \( \frac{\sqrt{3}}{2} \)  
D) \( \sqrt{2} \)

16) \( \cos \left( \frac{2\pi}{3} \right) \)
A) \( -\frac{1}{2} \)  
B) \( \frac{1}{2} \)  
C) \( \frac{\sqrt{2}}{2} \)  
D) \( -\frac{\sqrt{3}}{2} \)

17) \( \sec \left( \frac{\pi}{2} \right) \)
A) 1  
B) 0  
C) -1  
D) Undefined

Solve for the angle \( \theta \), where \( 0 \leq \theta \leq 2\pi \)

18) \( \sin^2 \theta = \frac{1}{4} \)
A) \( \theta = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4} \)  
B) \( \theta = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6} \)  
C) \( \theta = 0, \pi, 2\pi \)  
D) \( \theta = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3} \)
19) \( \cos^2 \theta = \frac{3}{4} \)

A) \( \theta = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4} \)

B) \( \theta = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3} \)

C) \( \theta = \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6} \)

D) \( \theta = 0, \pi, 2\pi \)

20) \( \sin 2\theta - \cos \theta = 0 \)

A) \( \theta = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6} \)

B) \( \theta = \frac{\pi}{2}, \pi, \frac{3\pi}{2}, 2\pi \)

C) \( \theta = \frac{3\pi}{2}, \frac{\pi}{2}, \frac{5\pi}{6}, \frac{5\pi}{6} \)

D) \( \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{6}, \frac{11\pi}{6} \)

State the period of the function and graph.

21) \( \cos 4x \)

A) Period \( \frac{\pi}{2} \)

B) Period \( \frac{\pi}{2} \)
22) $\sin \left( x + \frac{\pi}{4} \right) - 2$
Solve the problem.

23) Given \( \lim_{x \to 0^-} f(x) = L_l \) and \( \lim_{x \to 0^+} f(x) = L_r \), and \( L_l \neq L_r \), which of the following statements is true?

I. \( \lim_{x \to 0} f(x) = L_l \)
II. \( \lim_{x \to 0} f(x) = L_r \)
III. \( \lim_{x \to 0} f(x) \) does not exist.

A) I \hspace{1cm} B) II \hspace{1cm} C) III \hspace{1cm} D) none

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

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

25) \( \lim_{x \to -1} f(x) \)

A) \(-\frac{1}{2}\)  
B) \(\infty\)  
C) \(\frac{1}{2}\)  
D) \(-1\)

26) \( \lim_{x \to 0} f(x) \)

A) 0  
B) \(-3\)  
C) 3  
D) does not exist
27) \( \lim_{x \to 0} f(x) \)

A) -1  
B) \( \infty \)  
C) does not exist  
D) 1

28) \( \lim_{x \to 0} f(x) \)

A) 1  
B) 0  
C) does not exist  
D) \(-2\)
29) Find \( \lim_{x \to -1^-} f(x) \) and \( \lim_{x \to -1^+} f(x) \).

Use the table of values of \( f \) to estimate the limit.

30) Let \( f(x) = x^2 + 8x - 2 \), find \( \lim_{x \to 2} f(x) \).

<table>
<thead>
<tr>
<th>( x )</th>
<th>1.9</th>
<th>1.99</th>
<th>1.999</th>
<th>2.001</th>
<th>2.01</th>
<th>2.1</th>
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<tbody>
<tr>
<td>( f(x) )</td>
<td>5.043</td>
<td>5.364</td>
<td>5.404</td>
<td>5.436</td>
<td>5.763</td>
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</table>

A) \( x \) | 1.9 | 1.99 | 1.999 | 2.001 | 2.01 | 2.1 |
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<td>( f(x) )</td>
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<td>17.592</td>
<td>17.689</td>
<td>17.710</td>
<td>17.808</td>
<td>18.789</td>
</tr>
</tbody>
</table>

B) \( x \) | 1.9 | 1.99 | 1.999 | 2.001 | 2.01 | 2.1 |
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<tr>
<td>( f(x) )</td>
<td>16.810</td>
<td>17.880</td>
<td>17.988</td>
<td>18.012</td>
<td>18.120</td>
<td>19.210</td>
</tr>
</tbody>
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C) \( x \) | 1.9 | 1.99 | 1.999 | 2.001 | 2.01 | 2.1 |
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D) \( x \) | 1.9 | 1.99 | 1.999 | 2.001 | 2.01 | 2.1 |
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Provide an appropriate response.

31) Provide a short sentence that summarizes the general limit principle given by the formal notation \( \lim_{x \to a} [f(x) \pm g(x)] = \lim_{x \to a} f(x) \pm \lim_{x \to a} g(x) = L \pm M \), given that \( \lim_{x \to a} f(x) = L \) and \( \lim_{x \to a} g(x) = M \).

A) The sum or the difference of two functions is the sum of two limits.
B) The limit of a sum or a difference is the sum or the difference of the functions.
C) The sum or the difference of two functions is continuous.
D) The limit of a sum or a difference is the sum or the difference of the limits.

Find the limit.

32) \( \lim_{x \to 11} \sqrt{3} \)

A) 3
B) \( \sqrt{11} \)
C) 11
D) \( \sqrt{3} \)
33) \[ \lim_{x \to -10} (2x - 10) \]

A) -30   B) 30   C) 10   D) -10

Give an appropriate answer.

34) Let \( \lim_{x \to 7} f(x) = -10 \) and \( \lim_{x \to 7} g(x) = 3 \). Find \( \lim_{x \to 7} [f(x) \cdot g(x)] \).

A) -30   B) -7   C) 3   D) 7

35) Let \( \lim_{x \to -6} f(x) = -8 \) and \( \lim_{x \to -6} g(x) = 5 \). Find \( \lim_{x \to -6} \frac{f(x)}{g(x)} \).

A) -6   B) -13   C) -\frac{5}{8}   D) -\frac{8}{5}

36) Let \( \lim_{x \to 6} f(x) = 121 \). Find \( \lim_{x \to 6} \sqrt{f(x)} \).

A) 3.3166   B) 121   C) 11   D) 6

37) Let \( \lim_{x \to -9} f(x) = -5 \) and \( \lim_{x \to -9} g(x) = -7 \). Find \( \lim_{x \to -9} \left[ \frac{-8f(x) - 2g(x)}{-9 + g(x)} \right] \).

A) -\frac{13}{8}   B) -9   C) -\frac{27}{8}   D) -\frac{58}{9}

Find the limit.

38) \( \lim_{x \to 1} \frac{3x^2 + 7x - 2}{3x^2 - 4x - 2} \)

A) 0   B) -\frac{8}{3}   C) Does not exist   D) -\frac{7}{4}

39) \( \lim_{h \to 0} \frac{2}{\sqrt{3h + 4} + 2} \)

A) 1   B) 2   C) 1/2   D) Does not exist

40) \( \lim_{x \to 0} \frac{\sqrt{1 + x} - 1}{x} \)

A) 1/2   B) Does not exist   C) 1/4   D) 0
Determine the limit by sketching an appropriate graph.

41) \[ \lim_{x \to 1^-} f(x), \text{ where } f(x) = \begin{cases} \sqrt{1 - x^2} & 0 \leq x < 1 \\ 1 & 1 \leq x < 3 \\ 3 & x = 3 \end{cases} \]

42) \[ \lim_{x \to -8^+} f(x), \text{ where } f(x) = \begin{cases} 2x & -8 \leq x < 0, \text{ or } 0 < x \leq 3 \\ 2 & x = 0 \\ 0 & x < -8 \text{ or } x > 3 \end{cases} \]

Find the limit, if it exists.

43) \[ \lim_{x \to 0} \frac{x^3 + 12x^2 - 5x}{5x} \]

44) \[ \lim_{x \to 1} \frac{x^4 - 1}{x - 1} \]
45) \[ \lim_{x \to 3} \frac{x^2 + 6x - 27}{x - 3} \]

A) 0 \quad B) 12 \quad C) 6 \quad D) Does not exist

46) \[ \lim_{h \to 0} \frac{(x + h)^3 - x^3}{h} \]

A) 3x^2 \quad B) 0 \quad C) Does not exist \quad D) 3x^2 + 3xh + h^2

47) \[ \lim_{x \to 8} \frac{|8 - x|}{8 - x} \]

A) -1 \quad B) 1 \quad C) 0 \quad D) Does not exist

Provide an appropriate response.

48) If \( x^3 \leq f(x) \leq x \) for \( x \) in \([-1,1]\), find \( \lim_{x \to 0} f(x) \) if it exists.

A) does not exist \quad B) 0 \quad C) -1 \quad D) 1

For the function \( f \) whose graph is given, determine the limit.

49) Find \( \lim_{x \to 1^+} f(x) \).

A) 4 \quad B) 3 \quad C) does not exist \quad D) 3 \frac{1}{2}

Find the limit.

50) \[ \lim_{x \to -2} \frac{1}{x + 2} \]

A) -\infty \quad B) \infty \quad C) Does not exist \quad D) 1/2

51) \[ \lim_{x \to -1^-} \frac{1}{x + 1} \]

A) -\infty \quad B) -1 \quad C) -\infty \quad D) 0
52) \[ \lim_{x \to 2^+} \frac{3}{x^2 - 4} \]
A) \( \infty \)  B) 0  C) \(-\infty \)  D) 1

Find all vertical asymptotes of the given function.

53) \[ h(x) = \frac{x + 6}{x^2 - 49} \]
A) \( x = 49, x = -6 \)  B) \( x = -7, x = 7, x = -6 \)  
C) \( x = -7, x = 7 \)  D) \( x = 0, x = 49 \)

54) \[ f(x) = \frac{x + 6}{x^2 + 1} \]
A) \( x = -1, x = 1, x = -6 \)  B) \( x = -1, x = -6 \)  
C) \( x = -1, x = 1 \)  D) none

Find all points where the function is discontinuous.

55) 
A) \( x = 4 \)  B) None  C) \( x = 4, x = 2 \)  D) \( x = 2 \)

56) 
A) \( x = 2 \)  C) \( x = -2, x = 0 \)  B) \( x = -2, x = 0, x = 2 \)  D) \( x = 0, x = 2 \)

57) 
A) \( x = 1 \)  B) None  C) \( x = -2, x = 1 \)  D) \( x = -2 \)
Provide an appropriate response.

58) Is \( f \) continuous at \( f(1) \)?

\[
 f(x) = \begin{cases} 
 -x^2 + 1, & -1 \leq x < 0 \\
 2x, & 0 < x < 1 \\
 -4, & x = 1 \\
 -2x + 4, & 1 < x < 3 \\
 4, & 3 < x < 5 
\end{cases}
\]

A) Yes  
B) No

59) Is \( f \) continuous at \( x = 0 \)?

\[
 f(x) = \begin{cases} 
 x^3, & -2 < x \leq 0 \\
 -4x, & 0 \leq x < 2 \\
 1, & 2 < x \leq 4 \\
 0, & x = 2 
\end{cases}
\]

A) No  
B) Yes

Find the intervals on which the function is continuous.

60) \( y = \sqrt{x^2 - 2} \)

A) continuous on the intervals \(( -\infty, -\sqrt{2} ] \) and \([ \sqrt{2}, \infty ) \)
B) continuous everywhere
C) continuous on the interval \([ -\sqrt{2}, \sqrt{2} ] \)
D) continuous on the interval \([ \sqrt{2}, \infty ) \)
Provide an appropriate response.

61) Is \( f \) continuous on \((-2, 4]\)?

\[
f(x) = \begin{cases} 
  x^3, & -2 < x \leq 0 \\
  -2x, & 0 \leq x < 2 \\
  7, & 2 < x \leq 4 \\
  0, & x = 2 
\end{cases}
\]

A) No  
B) Yes

Find the limit, if it exists.

62) \( \lim_{x \to 0} \sqrt{x} - 2 \)

A) 0  
B) Does not exist  
C) 2  
D) -2

63) \( \lim_{x \to 2} \sqrt{x - 5} \)

A) -1.7320508  
B) 0  
C) Does not exist  
D) 1.73205081

64) \( \lim_{x \to 5^+} \frac{5\sqrt{(x - 5)^3}}{x - 5} \)

A) 5\(\sqrt{5}\)  
B) 0  
C) 5  
D) Does not exist

A function \( f(x) \), a point \( x_0 \), the limit of \( f(x) \) as \( x \) approaches \( x_0 \), and a positive number \( \varepsilon \) is given. Find a number \( \delta > 0 \) such that for all \( x \), \( 0 < |x - x_0| < \delta \Rightarrow |f(x) - L| < \varepsilon \).

65) \( f(x) = 5x - 6 \), \( L = -1 \), \( x_0 = 1 \), and \( \varepsilon = 0.01 \)

A) 0.004  
B) 0.002  
C) 0.01  
D) 0.001
Answer Key
Testname: M150_E1_PRAC

1) B
2) B
3) D
4) D
5) A
6) B
7) B
8) A
9) D
10) D
11) A
12) B
13) C
14) C
15) D
16) A
17) D
18) B
19) C
20) C
21) C
22) C
23) C
24) B
25) C
26) D
27) C
28) D
29) A
30) C
31) D
32) D
33) A
34) A
35) D
36) C
37) C
38) B
39) C
40) A
41) A
42) C
43) D
44) C
45) B
46) A
47) D
48) B
49) B
50) C
Answer Key
Testname: M150_E1_PRAC

51) C
52) A
53) C
54) D
55) A
56) B
57) A
58) B
59) B
60) A
61) A
62) D
63) C
64) B
65) B