1. The motion of a particle is given parametrically by the following formulas

\[ x = 1 + t, \quad y = 2 - 3t, \quad 0 \leq t \leq 6 \]

Eliminate the parameter to find the equation of the curve on which the motion takes place, then describe the motion precisely.

2. (a) Compute \( \lim_{x \to 0^-} \frac{2 + x^2}{x} \)

(b) Evaluate \( \lim_{x \to 0} \frac{x^2 - 4}{x + 2} \)

3. (a) Below is a list of formulas and a collection of function graphs. Next to each formula, write the letter of the graph that matches that formula: The function \( f \) is not given by formula. Its graph is shown to the right.

(A) \((x + 3)/(x^2 - 4)\) ________
(B) \(f(x + 2)\) ________
(C) \(2f(x)\) ________
(D) \((2 - x^2)\) ________

(E) \(f(2x)\) ________
(F) \((x - 1)\) ________
(G) \(f(x - 2)\) ________
(H) \((2 + f(x))\) ________
(I) \((2 - f(x))\) ________

(b) If \( f(x) = 1 + \sqrt{x} \), and \( g(x) = (x + 1)^2 \), what is the natural domain of the functions \( f^2g \) and \( \frac{f}{g^2} \)?

(c) What is the natural domain for the function \( f(x) = \frac{\sqrt{x - 1}}{x^2 - 9} \)?

4. If \( f(x) = 1 + \sqrt{x} \), and \( g(x) = (x + 1)^2 \), for what \( x \) is it true that \( 4(f(x) - 1)^2 = g(x) \)?

5. (a) Find the equation of the line that goes through the point \((1, 1)\) and has \( y \) intercept 5.

(b) What is the slope of the line in part (a)?

(c) What is the intercept of the line in part (a)?

(d) What is the equation of the line that passes through the point \((2, 6)\) and is parallel to the line in part (a)?
(e) What is the equation of the line that passes through the point (−4, 3) and is perpendicular to the line in part (a)?

6. Let \( f(x) \) be the function whose graph is shown below.

![Graph of \( f(x) \)](image)

(a) Compute the requested numbers
\[
\begin{align*}
f(4) &= \\
\lim_{x \to -2^-} f(x) &= \\
\lim_{x \to -2^+} f(x) &= \\
f(2) &= \\
\lim_{x \to 2^-} f(x) &= \\
\lim_{x \to 2^+} f(x) &= \\
\lim_{x \to 0^-} f(x) &= \\
\lim_{x \to 0^+} f(x) &= \\
\lim_{x \to \infty} f(x) &= \\
\lim_{x \to -\infty} f(x) &= 
\end{align*}
\]

(b) What are the points of discontinuity for \( f \)?

(c) Is there any value of \( f(2) \), would make \( f \) continuous at \( x = 2 \)? What about \( f(4) \)?

7. Let \( f(x) = \begin{cases} 1, & \text{if } x < 1 \\ x^3, & \text{if } 1 \leq x \leq 2 \\ x - 6, & \text{if } x > 2 \end{cases} \)

Sketch the graph of \( f \) and identify the points (if any) where \( f \) is not continuous.

8. Compute \( \lim_{x \to 0} \frac{\sin(4x)}{3x} \)

9. Compute \( \lim_{x \to 0} \frac{\sin^2(x)}{5x} \)

10. Compute \( \lim_{x \to 0} \frac{1 - \cos(2x)}{3x} \)
Additional quick problems (Multiple choice – T-F) to practice on.
(Numbered from 8 to 26 in the samples they came from)

8. The graph of \( y = (x - 2)^3 \) is obtained from the graph of \( y = x^3 \) by

A. translating vertically 2 units upward
B. translating vertically 2 units downward
C. translating horizontally 2 units to the left
D. translating horizontally 2 units to the right

9. The slope-intercept form of a line having a slope of 5 and a y-intercept of 3 is

A. \( x = 5y + 3 \)  
B. \( x = 5y - 3 \)  
C. \( y = 5x + 3 \)  
D. \( y = 5x - 3 \)

10. \( f(x) = \frac{1}{x^2} - 1 \). The natural domain of the function is

A. all real numbers
B. all real numbers except 1
C. all real numbers except \(-1\) and 1
D. all real numbers except \(-1, 0,\) and 1

11. The natural domain of \( g(x) = \sqrt{9 - x^2} \) is

A. \( \{x : -3 \leq x \leq 3\} \)  
B. \( \{x : -9 \leq x \leq 3\} \)  
C. \( \{x : x \geq -9\} \)  
D. \( \{x : x \geq -3\} \)

12. Find \( f(2) \) if \( f(x) = \begin{cases} \frac{4}{x} & \text{if } x < 2 \\ 3x & \text{if } x \geq 2 \end{cases} \).

A. 2  
B. 4  
C. 6

13. The graph on the left is the graph of \( f(x) = \sqrt{x} \). The graph on the right is the graph of

A. \( y = \sqrt{f(x + 4)} \)  
B. \( y = \sqrt{f(x - 4)} \)  
C. \( y = f(x) - 4 \)  
D. \( y = f(x) + 4 \)

14. The graph of \( y = 1 + (x + 2)^2 \) is obtained from the graph of \( y = x^2 \) by

A. translating horizontally 2 units to the right, then translating vertically 1 unit up
B. translating horizontally 2 units to the left, then translating vertically 1 unit up
C. translating horizontally 2 units to the right, then translating vertically 1 unit down
D. translating horizontally 2 units to the left, then translating vertically 1 unit down
15. The graph of \( y = \sqrt{x} \) and \( y = \sqrt{-x} \) are related. The graph of \( y = \sqrt{-x} \) is obtained by

A. reflecting the graph of \( y = \sqrt{x} \) about the \( x \)-axis
B. reflecting the graph of \( y = \sqrt{x} \) about the \( y \)-axis
C. reflecting the graph of \( y = \sqrt{x} \) about the origin
D. The equations are not both defined.

16. The graphs of \( y = x^2 \) and \( y = 4 - 2(x - 1)^3 \) are related. Of reflection, stretching, vertical translation, and horizontal translation, which should be done first?

A. reflection  B. stretching
C. vertical translation  D. horizontal translation

17. The slope-intercept form of a line having a slope of 4 and a \( y \)-intercept of 5 is

A. \( x = 4y + 5 \)  B. \( y = 4x + 5 \)  C. \( y = -4x - 5 \)  D. \( x = -4y - 5 \)

18. Answer true or false. The lines \( y = 5x + 4 \) and \( y = -5x + 4 \) are parallel.

19. Answer true or false. The lines \( y = 2x - 1 \) and \( x + 2y = 6 \) are perpendicular.

20. The slope-intercept form of the equation of the graphed line is

A. \( y = 3x - 5 \)  B. \( y = 3x + 5 \)  C. \( y = -3x + 5 \)  D. \( y = -3x - 5 \)

21. Given that \( \lim_{x \to a} f(x) = 3 \) and \( \lim_{x \to a} g(x) = 5 \), find, if it exists, \( \lim_{x \to a} [f(x) - g(x)]^2 \).

22. \( \lim_{x \to -3} \frac{x^2 - 9}{x + 3} = \)

23. \( \lim_{x \to 5} \frac{4}{x - 5} = \)

24. \( \lim_{x \to +\infty} \frac{10x}{x^2 - 5x + 3} = \)

25. Let \( g(x) = \begin{cases} x^2 + 4, & x \leq 1 \\ x^3, & x > 1 \end{cases} \). \( \lim_{x \to 1^-} g(x) = \)

26. Find the \( x \)-coordinates for all points of discontinuity for \( f(x) = \frac{|x + 5|}{x^2 + 5x} \).