Unit 1 Progress Check: MCQ Part A

1. The function f is given by $f(x) = 0.2x^4 - 1.0x^3 - 6.6x^2 + 15.4x - 1.99$. For how many positive values of b does $\lim_{x \to b} f(x) = 6$?

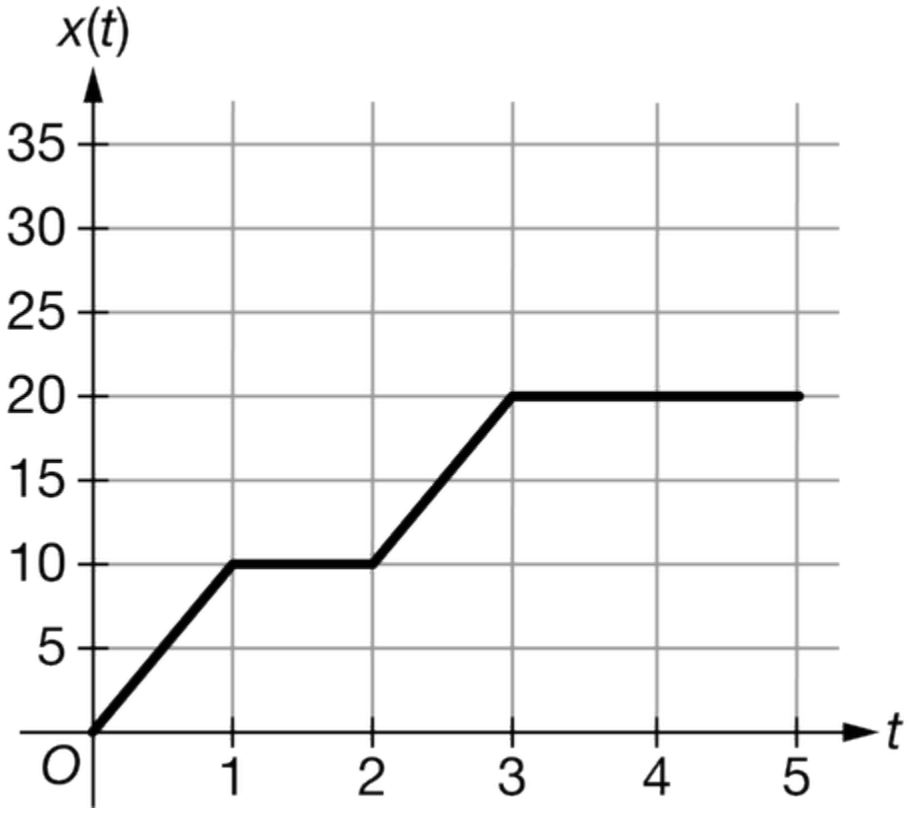
(A) One

(B) Two

(C) Three ✓

(D) Four

2.



A particle is moving on the x-axis and the position of the particle at time t is given by $x(t)$, whose graph is given above. Which of the following is the best estimate for the speed of the particle at time $t = 4$?

(A) 0 ✓

(B) 5

(C) $\frac{20}{3}$

(D) 20

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3.

t (seconds)	0	20	40	60	80	100	120
$y(t)$ (feet)	0	105	300	900	2400	5000	10,000

A model rocket leaves the ground at time $t = 0$ and travels straight up from the ground. The height, in feet, of the rocket above the ground is given by $y(t)$, where t is measured in seconds for $0 \le t \le 120$. Values of $y(t)$ for selected values of t are given in the table above. Of the following values of t, at which value would the velocity of the rocket most likely be greatest based on the data in the table?

(A) $t = 20$

(B) $t = 40$

(C) $t = 60$

(D) $t = 80$ ✓

4. The position of a particle moving to the right on the x-axis is given by $x(t)$, where $x(t)$ is measured in centimeters and t is measured in seconds for $0 \le t \le 50$. If $y = x(t)$ is a linear function, which of the following would most likely give the best estimate of the speed of the particle, in centimeters per second, at time $t = 10$ seconds?

(A) $x(10)$

(B) $\frac{x(10)}{10}$

(C) $x(11) - x(9)$

(D) The slope of the graph of $y = x(t)$ ✓

5. Let f be the function given by $f(x) = \frac{e^{3x}-1}{x}$ for $x \neq 0$. Which of the following equations expresses the property that $f(x)$ can be made arbitrarily close to 3 by taking x sufficiently close to 0, but not equal to 0 ?

(A) $f(0) = 3$

(B) $f\left(\lim_{x \to 0} x\right) = 3$

(C) $\lim_{x \to 0} f(x) = 3$ ✓

(D) $\lim_{x \to 3} f(x) = 0$

6. The function f has the property that as x gets closer and closer to 3, the values of $f(x)$ get closer and closer to 5. Which of the following statements must be true?

(A) $f(3) = 5$

(B) $f(5) = 3$

(C) $\lim_{x \to 3} f(x) = 5$ ✓

(D) $\lim_{x \to 5} f(x) = 3$

7. A function f satisfies $\lim_{x \to 3} f(x) = 6$. Which of the following could be the graph of f ?

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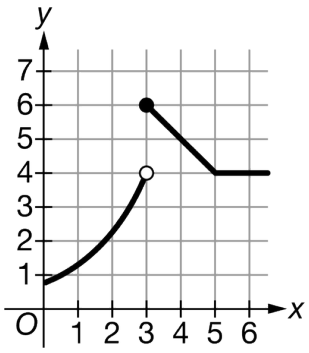
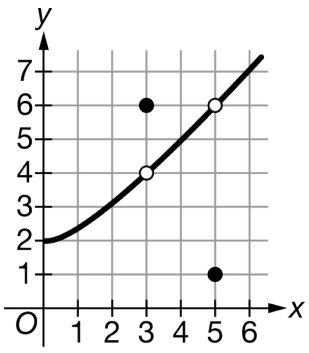
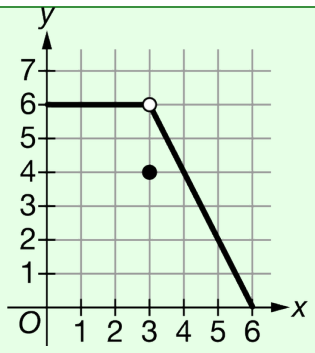
(A)



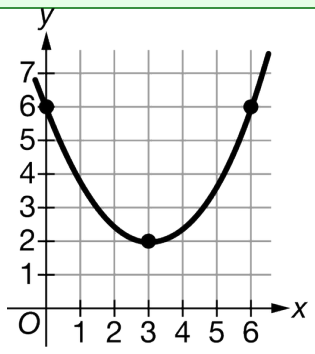
(B)



(C) ✓



(D)



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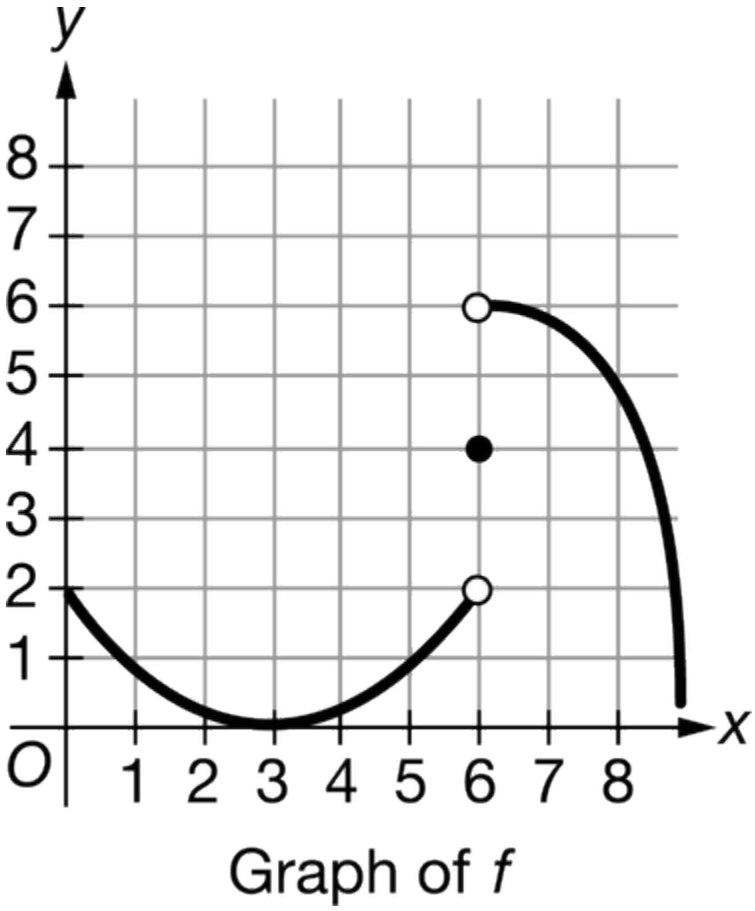
8.



Graph of f

The graph of the function f is shown above. Which of the following expressions equals 2 ?

(A) $f(6)$

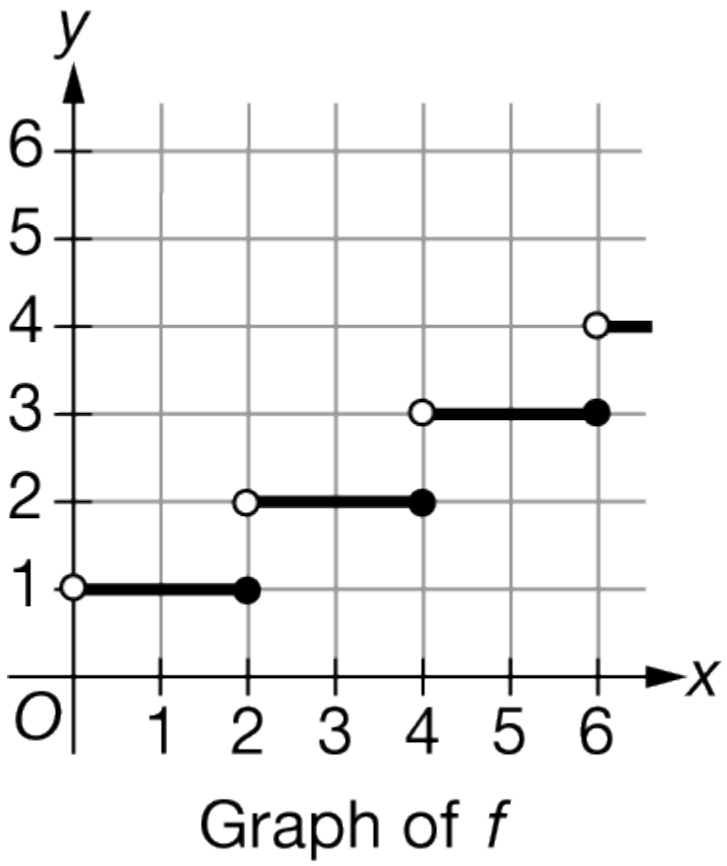
(B) $\lim_{x \to 6^-} f(x)$ ✓

(C) $\lim_{x \to 6^+} f(x)$

(D) $\lim_{x \to 6} f(x)$

Unit 1 Progress Check: MCQ Part A

9.



Graph of f

The graph of the function f is shown above. The value of $\lim_{x \to 4} f(x)$ is

(A) 2

(B) $\frac{5}{2}$

(C) 3

(D) nonexistent ✓

10.

x	3.9	3.99	3.999	4.001	4.01	4.1
$f(x)$	7.018	7.007	7.002	6.998	5.982	5.887

The table above gives selected values for a continuous function f. Based on the data in the table, which of the following is the best approximation for $\lim_{x \to 4} f(x)$?

(A) 0

(B) 4

(C) 7 ✓

(D) There is no best approximation, because the limit does not exist.

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11.

x	4.9	4.99	4.999	4.9999	5.0001	5.001	5.01	5.1
$f(x)$	4	-16	-256	-726	7.9999	7.999	7.99	7.9

The table above gives values of a function f at selected values of x. Which of the following conclusions is supported by the data in the table?

(A) $\lim_{x \to 5} f(x) = 8$

(B) $\lim_{x \to 5^-} f(x) = 8$

(C) $\lim_{x \to 5^+} f(x) = 8$ ✓

(D) $\lim_{x \to 8^+} f(x) = 5$

12.

x	1.9	1.99	1.999	1.9999	2	2.0001	2.001	2.01	2.1
$f(x)$	7.80	7.86	7.90	7.95	3	8.05	8.10	8.14	8.20

The table above gives values of the function f at selected values of x. Which of the following statements must be true?

(A) $\lim_{x \to 2} f(x) = 3$

(B) $\lim_{x \to 2} f(x) = 8$

(C) $\lim_{x \to 2} f(x)$ does not exist.

(D) $\lim_{x \to 2} f(x)$ cannot be definitively determined from the data in the table. ✓

13. $f(x) = \begin{cases} 2x + 2 & \text{for } x < 1 \\ x^2 + 4 & \text{for } x > 1 \end{cases}$

If f is the function defined above, then $\lim_{x \to 1^-} f(x)$ is

(A) 2

(B) 4 ✓

(C) 5

(D) nonexistent

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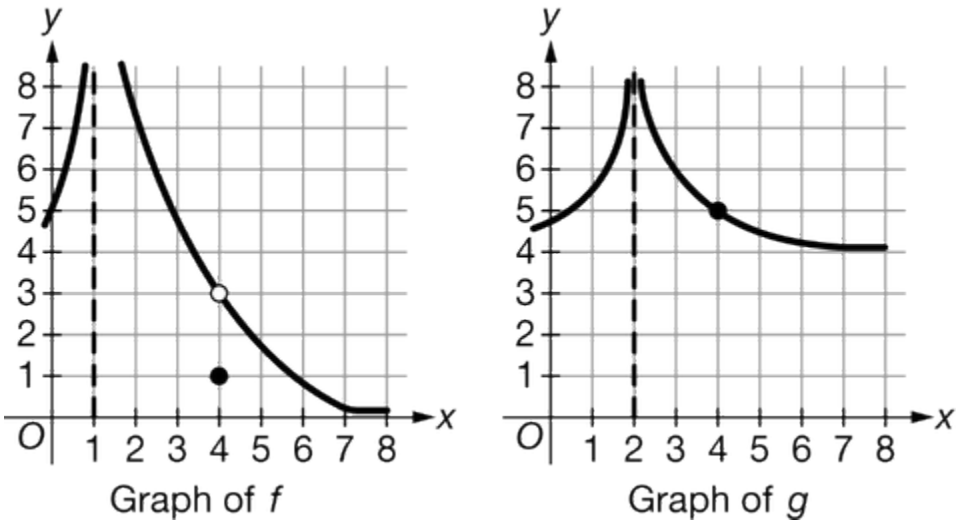
14.



The graphs of the functions f and g are shown above. The value of $\lim_{x \to 4} \frac{f(x)+6}{g(x)}$ is

(A) $\frac{3}{5}$

(B) $\frac{7}{5}$

(C) $\frac{9}{5}$ ✓

(D) nonexistent

15. $\lim_{x \to 0} \frac{\cos x + 4e^x}{5e^x}$ is

(A) $\frac{1}{5}$

(B) $\frac{4}{5}$

(C) 1 ✓

(D) nonexistent

16. If f is the function defined by $f(x) = \frac{x-4}{\sqrt{x}-2}$, then $\lim_{x \to 4} f(x)$ is equivalent to which of the following?

(A) $\lim_{x \to 4} \left(\sqrt{x} - 2\right)$

(B) $\lim_{x \to 4} \left(\sqrt{x} + 2\right)$ ✓

(C) $\lim_{x \to 4} \left(\frac{x^2-16}{x-4}\right)$

(D) $\frac{\lim_{x \to 4}(x-4)}{\lim_{x \to 4}\left(\sqrt{x}-2\right)}$

17. $\lim_{x \to 0} \frac{5x^5+3x^2+18x}{3x^5+6x}$ is

Unit 1 Progress Check: MCQ Part A

(A) 0

(B) $\frac{5}{3}$

(C) 3 ✓

(D) ∞

18. If $f(x) = \frac{\cos x - 1}{\sin^2 x}$, then $\lim_{x \to 0} f(x)$ is equivalent to which of the following?

(A) $\lim_{x \to 0} \frac{-1}{1 + \cos x}$ ✓

(B) $\lim_{x \to 0} \frac{\cos x - 1}{1 + \cos^2 x}$

(C) $\lim_{x \to 0} \csc x$

(D) $\lim_{x \to 0} (\cot x - \csc x)$