Unit 1 Progress Check: MCQ Part A

1. The function f is given by $f(x) = 0.1x^4 - 0.5x^3 - 3.3x^2 + 7.7x - 1.99$. For how many positive values of b does $\lim_{x \to b} f(x) = 2$?
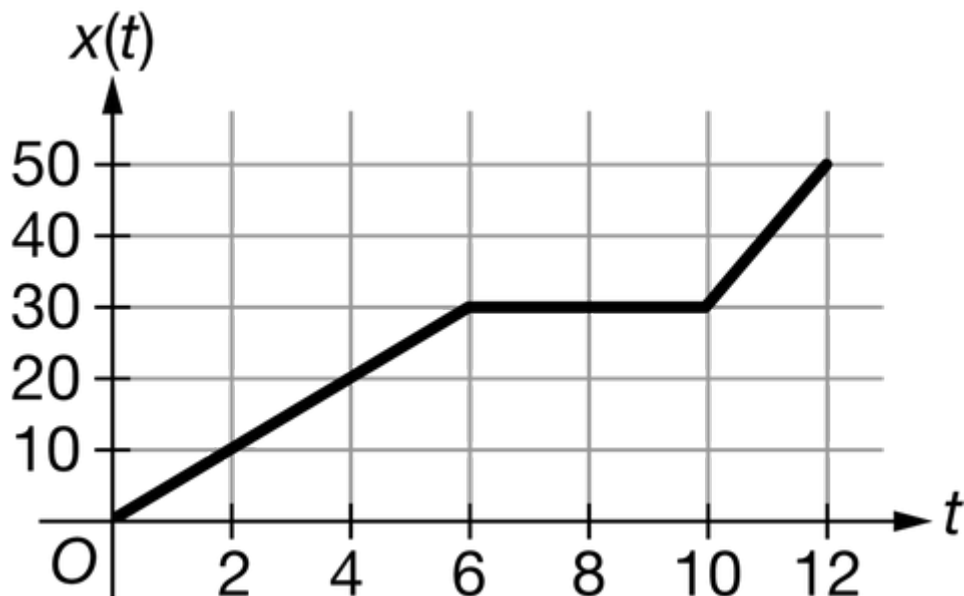
(A) One

(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 $t = 8$?

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(A) 0 ✓

(B) $\frac{15}{4}$

(C) 5

(D) 30

3.

t (seconds)	0	100	200	300	400	500	600
$y(t)$ (feet)	0	50	400	1360	3200	6250	10,950

A rocket leaves the surface of Earth at time $t = 0$ and travels straight up from the surface. The height, in feet, of the rocket above the surface of Earth is given by $y(t)$, where t is measured in seconds for $0 \le t \le 600$. 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 speed of the rocket most likely be greatest based on the data in the table?

(A) $t = 100$

(B) $t = 200$

(C) $t = 300$

(D) $t = 400$ ✓

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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 inches and t is measured in minutes for $0 \le t \le 100$. 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 inches per minute, at time $t = 20$ minutes?

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(A) $x\,(20)$

(B) $\dfrac{x(20)}{20}$

(C) $x(21) - x\,(19)$

> (D) The slope of the graph of $y = x\,(t)$ ✔

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5. Let f be the function given by $f(x) = \dfrac{e^{2x}-1}{x}$. Which of the following equations expresses the property that $f(x)$ can be made arbitrarily close to 2 by taking x sufficiently close to 0, but not equal to 0 ?

(A) $f(0) = 2$

(B) $f\left(\lim\limits_{x \to 0} x\right) = 2$

> (C) $\lim\limits_{x \to 0} f(x) = 2$ ✔

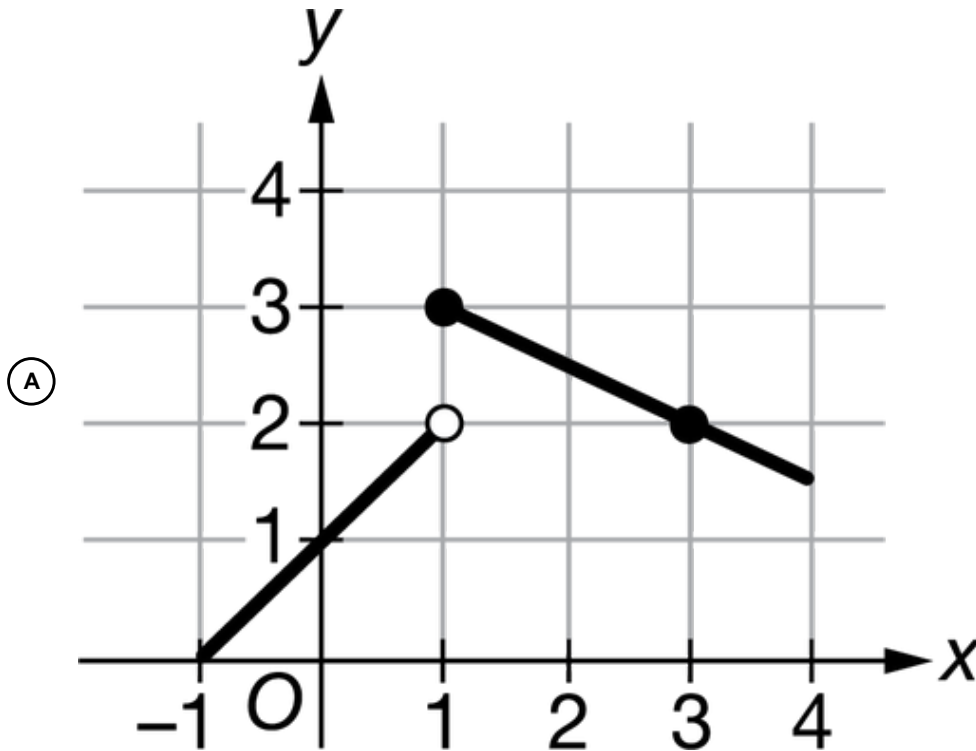(D) $\lim\limits_{x \to 2} f(x) = 0$

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6. The function f has the property that as x gets closer and closer to 4, the values of $f(x)$ get closer and closer to 7. Which of the following statements must be true?
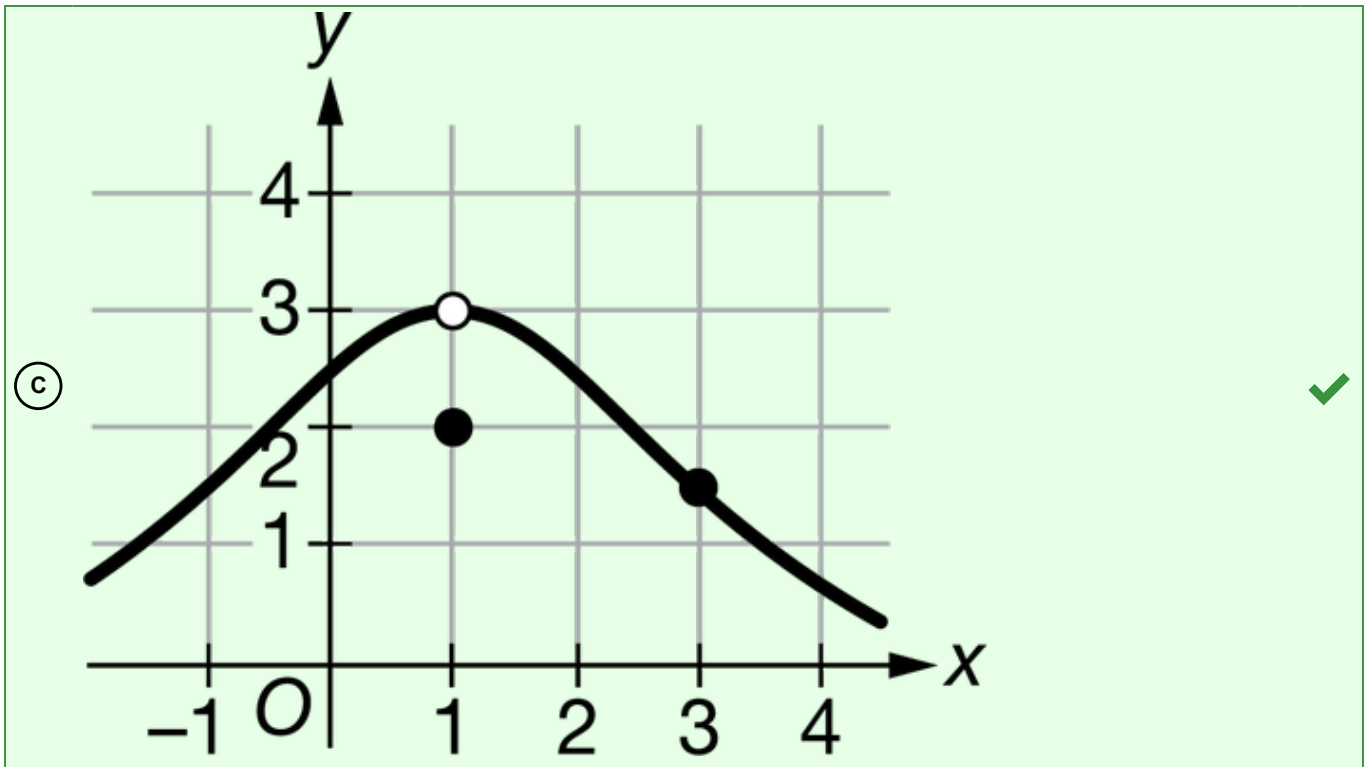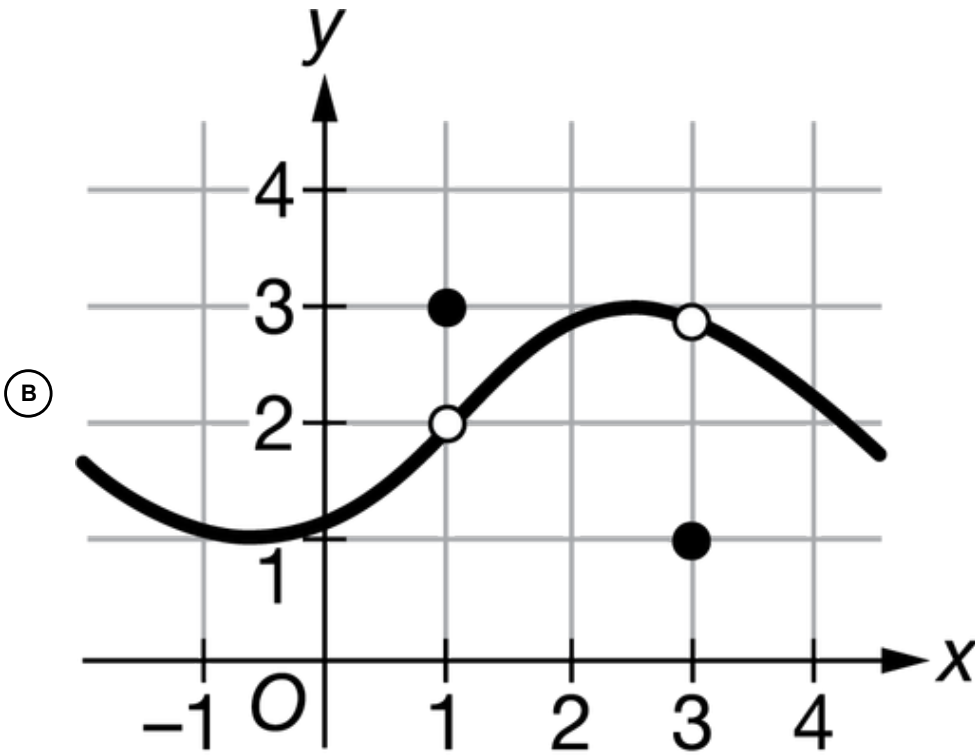
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(A) $f(4) = 7$

(B) $f(7) = 4$

(C) $\lim\limits_{x \to 4} f(x) = 7$ ✔

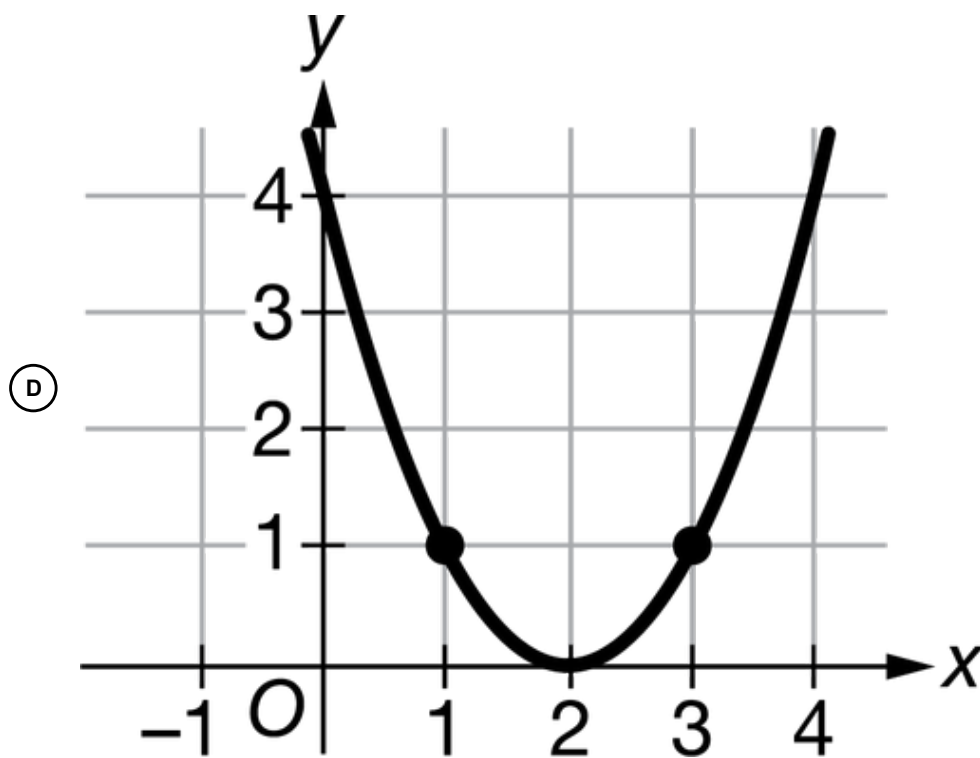(D) $\lim\limits_{x \to 7} f(x) = 4$

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7.   A function f satisfies $\lim\limits_{x \to 1} f(x) = 3$. Which of the following could be the graph of f?

(A)

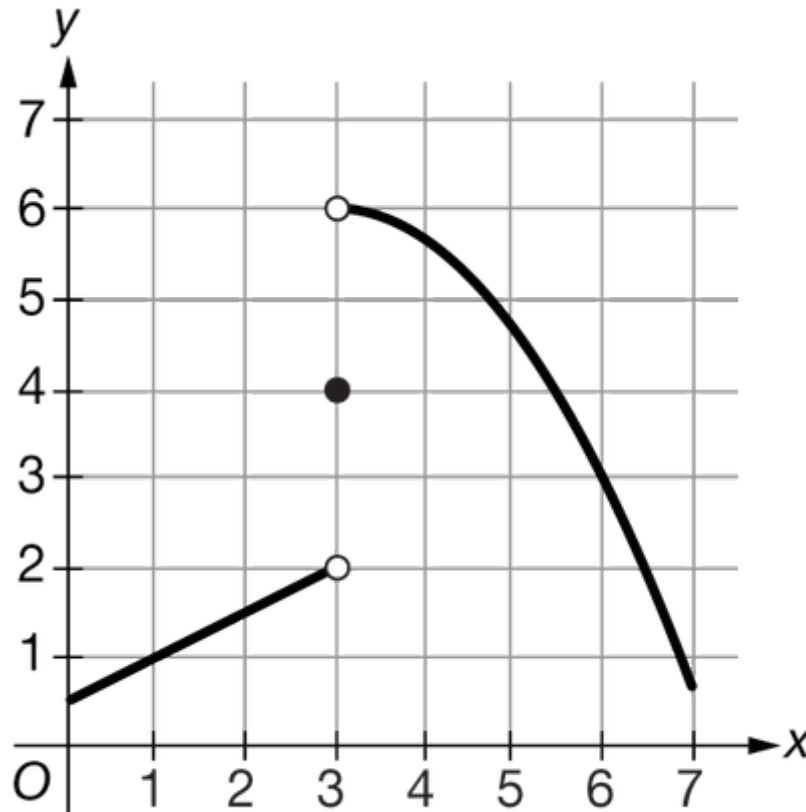## Unit 1 Progress Check: MCQ Part A

B

C ✔

Unit 1 Progress Check: MCQ Part A

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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) $f(3)$

(B) $\displaystyle\lim_{x \to 3^-} f(x)$ ✓

(C) $\displaystyle\lim_{x \to 3^+} f(x)$

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

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9.
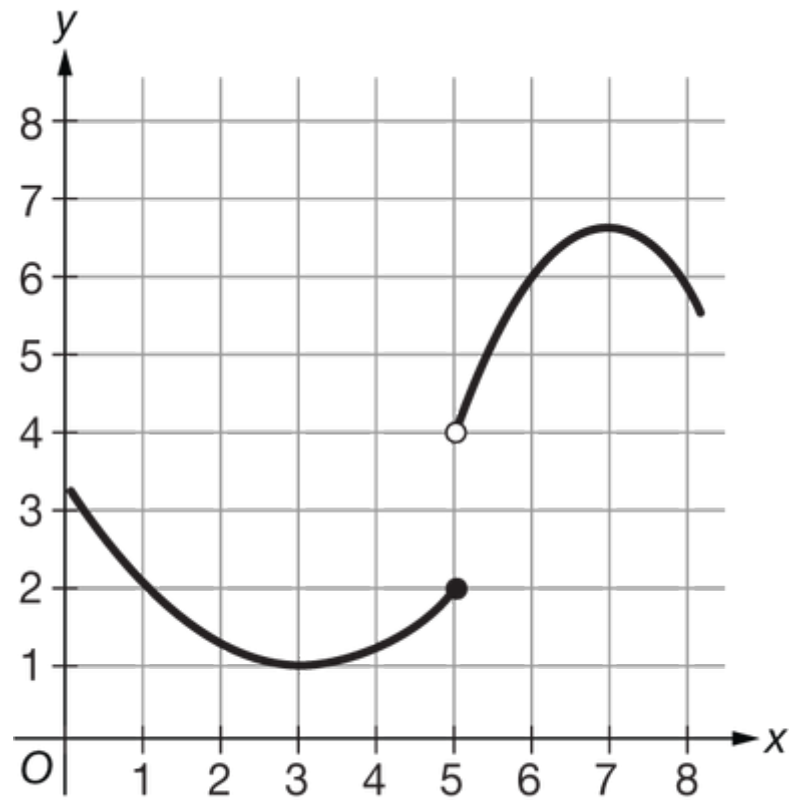
Graph of f

The graph of the function f is shown above. The value of $\lim_{x \to 5} f(x)$ is

(A) 2

(B) 3

(C) 4

(D) nonexistent　✔

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10.

x	2.9	2.99	2.999	3.001	3.01	3.1
$f(x)$	5.018	5.007	5.002	4.998	4.982	4.887

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 $\lim\limits_{x \to 3} f(x)$?

(A) 0

(B) 3

(C) 5 ✔

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

11.

x	3.9	3.99	3.999	3.9999	4.0001	4.001	4.01	4.1
$f(x)$	5	−25	125	−625	5.9999	5.999	5.99	5.9

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) $\lim\limits_{x \to 4} f(x) = 6$

(B) $\lim\limits_{x \to 4^-} f(x) = 6$

(C) $\lim\limits_{x \to 4^+} f(x) = 6$ ✔

(D) $\lim\limits_{x \to 6^+} f(x) = 4$

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12.

x	0.9	0.99	0.999	0.9999	1	1.0001	1.001	1.01	1.1
$f(x)$	6.80	6.86	6.90	6.95	2	7.05	7.10	7.14	7.20

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

(A) $\lim\limits_{x \to 1} f(x) = 2$

(B) $\lim\limits_{x \to 1} f(x) = 7$

(C) $\lim\limits_{x \to 1} f(x)$ does not exist.

(D) $\lim\limits_{x \to 1} f(x)$ cannot be definitively determined from the data in the table. ✔

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13. $f(x) = \begin{cases} x+3 & \text{for } x < 1 \\ -2x+7 & \text{for } x > 1 \end{cases}$

If f is the function defined above, then $\lim\limits_{x \to 1^-} f(x)$ is
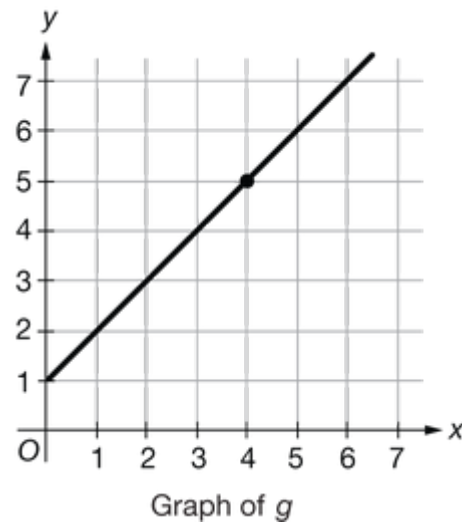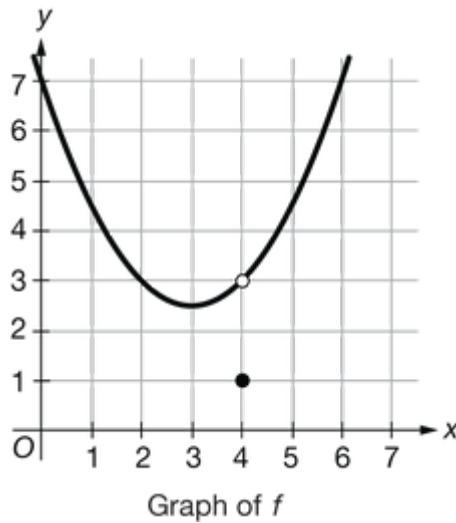
(A) 2

(B) 4 ✔

(C) 5

(D) nonexistent

Unit 1 Progress Check: MCQ Part A

14.

Graph of f Graph of g

The graphs of the functions f and g are shown above. The value of $\lim\limits_{x \to 4} \dfrac{f(x)+7}{g(x)}$ is

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

(B) $\dfrac{8}{5}$

(C)   2   ✔

(D)   nonexistent

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15. $\lim\limits_{x \to 0} \dfrac{\cos x + 3e^x}{2e^x}$ is

(A) $\dfrac{1}{2}$

(B) $\dfrac{3}{2}$

(C)   2   ✔

(D)   nonexistent

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16. If f is the function defined by $f(x) = \dfrac{x-9}{\sqrt{x}-3}$, then $\lim\limits_{x \to 9} f(x)$ is equivalent to which of the following?

(A) $\lim\limits_{x \to 9} (\sqrt{x} - 3)$

(B) $\lim\limits_{x \to 9} (\sqrt{x} + 3)$ ✔

(C) $\lim\limits_{x \to 9} \left(\dfrac{x^2 - 81}{x - 9} \right)$

(D) $\dfrac{\lim\limits_{x \to 9} (x-9)}{\lim\limits_{x \to 9} (\sqrt{x} - 3)}$

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17. $\lim\limits_{x \to 0} \dfrac{7x^5 + 5x^2 + 12x}{3x^5 + 4x}$ is

(A)   0

(B) $\dfrac{7}{3}$

(C)   3   ✔

(D) ∞

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

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A $\displaystyle\lim_{x\to\frac{\pi}{2}} \frac{-1}{1+\sin x}$ ✔

B $\displaystyle\lim_{x\to\frac{\pi}{2}} \frac{\sin x-1}{1+\sin^2 x}$

C $\displaystyle\lim_{x\to\frac{\pi}{2}} \sec x$

D $\displaystyle\lim_{x\to\frac{\pi}{2}} (\tan x - \sec x)$