1.

How many of the following statements about the function $y = f(x)$ pictured above, are true?

(i) $\lim_{x \to 1} f(x)$ exists

(ii) $\lim_{x \to 2} f(x)$ exists

(iii) $\lim_{x \to 3+} f(x)$ does not exist

(iv) $\lim_{x \to 3^-} f(x)$ does not exist

(A) 0 (B) 1 (C) 2 (D) 3 (E) 4

2. $\lim_{x \to 1} \frac{x - \sqrt{3x - 2}}{x^2 - 1} = ?$

(A) $\frac{1}{3}$ (B) $-\frac{1}{4}$ (C) $\frac{\sqrt{2}}{3}$ (D) $-\frac{1}{2}$ (E) $-\frac{3}{2}$

3. $\lim_{t \to 0^-} \frac{t}{\in t\square} = ?$

(A) $-\infty$ (B) 1 (C) ∞ (D) 0 (E) -1

4. $\lim_{h \to 0} \frac{\left(-\frac{1}{2} + h\right)^4 + \left(-\frac{1}{2}\right)^4}{h} = ?$

(A) 2 (B) $-\frac{1}{2}$ (C) $\frac{1}{4}$ (D) $-\frac{3}{4}$ (E) $\frac{1}{8}$

5. Which of the following partial graphs shows the behavior of

$f(x) = \dfrac{x - 2}{(x + 3)(x-1)^2}$ for x near 1?

(A)

(B)

(C)

(D)

(E)

6. Define $g\left(\frac{1}{2}\right)$ in a way that extends

$g(x) = \dfrac{2x - 1}{8x^2 - 4x}$

to be continuous at $x = \dfrac{1}{2}$.

(A) 2 (B) $-\dfrac{1}{4}$ (C) 0 (D) -1 (E) $\dfrac{1}{2}$

7. Let $f(x) = x^3 - x^2 + x + 3$. Which one of the following values must the function f take on at some point on the interval $[0, 1]$?

(A) -1 (B) $\sqrt{2}$ (C) $\dfrac{5}{2}$ (D) π (E) 7

8. The equation of the tangent line to the curve

$$y = 4 \cos x - 2 \sin x$$

at the point $\left(\frac{\pi}{2}, -2\right)$ is

(A) $y = -4x + 2\pi - 2$ (B) $y = 2x - 2\pi$

(C) $y = x - \frac{3}{2}\pi$ (D) $y = -4x + \pi + 1$

(E) $y = -2x$

9. $y = f(x)$ $y = g(x)$ $y = h(x)$

From the graphs, which one of the following statements appears to be true?

(A) f(x) is the derivative of h(x)
(B) g(x) is the derivative of f(x)
(C) g(x) is the derivative of h(x)
(D) h(x) is the derivative of f(x)
(E) h(x) is the derivative of g(x)

10. If $y = \frac{\tan x}{1 + \tan x}$, then the slope of the curve at the point $\left(\frac{\pi}{4}, \frac{1}{2}\right)$ is

(A) $\frac{\pi}{4}$ (B) 1 (C) $\frac{1}{2}$ (D) 0 (E) 2

11. Suppose that $f(x)$ is a function for which $f(1) = -3$ and $f'(1) = 1$. If $g(x) = (x + 1) f(x)$, then $g'(1) = ?$

(A) 2 (B) 0 (C) – 3 (D) 1 (E) – 1

12. The position of a body at time t seconds is $s = 2t^3 - 15t^2 + 54t - 12$ feet.

What is the body's velocity, in ft/sec, at the time the acceleration is 6 ft/sec^2?

(A) 12 (B) 0 (C) – 9 (D) 18 (E) – 15