

AB Review 09 NO Calculator Permitted

1. A particle moves along the y -axis with velocity given by $v(t) = 3t^2 + 6t$ for time $t \geq 0$. If the particle is at position $y = 2$ at time $t = 0$, what is the position of the particle at $t = 1$?
- (A) 4 (B) 6 (C) 9 (D) 11 (E) 12

2. If $f(x) = \cos(3x)$, then $f'\left(\frac{\pi}{9}\right) =$
- (A) $\frac{3\sqrt{3}}{2}$ (B) $\frac{\sqrt{3}}{2}$ (C) $-\frac{\sqrt{3}}{2}$ (D) $-\frac{3}{2}$ (E) $-\frac{3\sqrt{3}}{2}$

3. If $f(x) = \begin{cases} \frac{\sqrt{2x+5} - \sqrt{x+7}}{x-2}, & x \neq 2 \\ k, & x = 2 \end{cases}$, and if f is continuous at $x = 2$, then $k =$
- (A) 0 (B) $\frac{1}{6}$ (C) $\frac{1}{3}$ (D) 1 (E) $\frac{7}{5}$

4. $\int_0^8 \frac{dx}{\sqrt{1+x}} =$

- (A) 1 (B) $\frac{3}{2}$ (C) 2 (D) 4 (E) 6

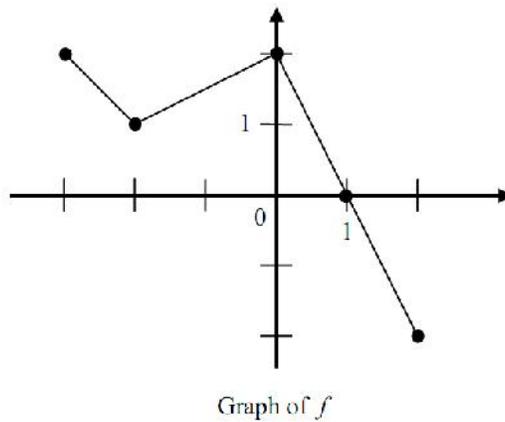
5. If $3x^2 + 2xy + y^2 = 2$, then the value of $\frac{dy}{dx}$ at $x = 1$ is

- (A) -2 (B) (C) 2 (D) 4 (E) not defined

6. What is $\lim_{h \rightarrow 0} \frac{8\left(\frac{1}{2} + h\right)^8 - 8\left(\frac{1}{2}\right)^8}{h}$?

- (A) 0 (B) $\frac{1}{2}$ (C) 1 (D) DNE (E) Cannot be determined from info given

7. For what value of k will $x + \frac{k}{x}$ have a relative maximum at $x = -2$?
- (A) -4 (B) -2 (C) 2 (D) 4 (E) None of these



8. The graph of the piecewise linear function f is shown in the figure above. If $g(x) = \int_{-2}^x f(t) dt$, which of the following values is greatest?
- (A) $g(-3)$ (B) $g(-2)$ (C) $g(0)$ (D) $g(1)$ (E) $g(2)$

9. When the area in square units of an expanding circle is increasing twice as fast as its radius in linear units, the radius is

- (A) $\frac{1}{4\pi}$ (B) $\frac{1}{4}$ (C) $\frac{1}{\pi}$ (D) 1 (E) π

10. If $f(x) = e^{(2/x)}$, then $f'(x) =$

- (A) $2e^{(2/x)} \ln x$ (B) $e^{(2/x)}$ (C) $e^{(-2/x^2)}$ (D) $-\frac{2}{x^2} e^{(2/x)}$ (E) $-2x^2 e^{(2/x)}$

11. (2000, AB-4) Water is pumped into an underground tank at a constant rate of 8 gallons per minute. Water leaks out of the tank at the rate of $\sqrt{t+1}$ gallons per minute, for $0 \leq t \leq 120$ minutes. At time $t = 0$, the tank contains 30 gallons of water.

(a) How many gallons of water leak out of the tank from time $t = 0$ to $t = 3$ minutes?

(b) How many gallons of water are in the tank at time $t = 3$ minutes?

(c) Write an expression for $A(t)$, the total number of gallons of water in the tank at time t .

(d) At what time t , for $0 \leq t \leq 120$, is the amount of water in the tank a maximum? Justify your answer.

12. (2000, AB/BC-5) Consider the curve given by $xy^2 - x^3y = 6$.

(a) Show that $\frac{dy}{dx} = \frac{3x^2y - y^2}{2xy - x^3}$.

(b) Find all the points on the curve whose x -coordinate is 1, and write an equation for the tangent line at each of these points.

(c) Find the x -coordinate of each point on the curve where the tangent line is vertical.