From the 1998 Multiple Choice

2. In the xy-plane, the graph of the parametric equations $x = 5t + 2$ and $y = 3t$, for $-3 \le t \le 3$, is a line segment with slope

(A) $\frac{3}{5}$ (B) $\frac{5}{3}$ (C) 3 (D) 5 (E) 13

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10. A particle moves on a plane curve so that at any time $t > 0$ its x-coordinate is $t^3 - t$ and its y-coordinate is $(2t - 1)^3$. The acceleration vector of the particle at $t = 1$ is

(A) (0, 1) (B) (2, 3) (C) (2, 6) (D) (6, 12) (E) (6, 24)

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21. The length of the path described by the parametric equations $x = \frac{1}{3}t^3$ and $y = \frac{1}{2}t^2$, where $0 \le t \le 1$, is given by

(A) $\int_0^1 \sqrt{t^2 + 1}\, dt$

(B) $\int_0^1 \sqrt{t^2 + t}\, dt$

(C) $\int_0^1 \sqrt{t^4 + t^2}\, dt$

(D) $\frac{1}{2}\int_0^1 \sqrt{4 + t^4}\, dt$

(E) $\frac{1}{6}\int_0^1 t^2\sqrt{4t^2 + 9}\, dt$

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77. If f is a vector-valued function defined by $f(t) = (e^{-t}, \cos t)$, then $f''(t) =$

(A) $-e^{-t} + \sin t$ (B) $e^{-t} - \cos t$ (C) $(-e^{-t}, -\sin t)$

(D) $(e^{-t}, \cos t)$ (E) $(e^{-t}, -\cos t)$

Answers

2. A 21. C
10. E 77. E

From 2003 BC Multiple Choice

4. For $0 \le t \le 13$, an object travels along an elliptical path given by the parametric equations $x = 3\cos t$ and $y = 4\sin t$. At the point where $t = 13$, the object leaves the path and travels along the line tangent to the path at that point. What is the slope of the line on which the object travels?

(A) $-\frac{4}{3}$ (B) $-\frac{3}{4}$ (C) $-\frac{4\tan 13}{3}$ (D) $-\frac{4}{3\tan 13}$ (E) $-\frac{3}{4\tan 13}$

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7. The position of a particle moving in the xy-plane is given by the parametric equations $x = t^3 - 3t^2$ and $y = 2t^3 - 3t^2 - 12t$. For what values of t is the particle at rest?

(A) -1 only (B) 0 only (C) 2 only (D) -1 and 2 only (E) -1, 0, and 2

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17. A curve C is defined by the parametric equations $x = t^2 - 4t + 1$ and $y = t^3$. Which of the following is an equation of the line tangent to the graph of C at the point $(-3, 8)$?

(A) $x = -3$ (B) $x = 2$ (C) $y = 8$ (D) $y = -\frac{27}{10}(x+3)+8$

(E) $y = 12(x+3)+8$

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84. A particle moves in the xy-plane so that its position at any time t is given by $x(t) = t^2$ and $y(t) = \sin(4t)$. What is the speed of the particle when $t = 3$?

(A) 2.909 (B) 3.062 (C) 6.884 (D) 9.016 (E) 47.393

Answers

4. D
7. C
17. A
84. C