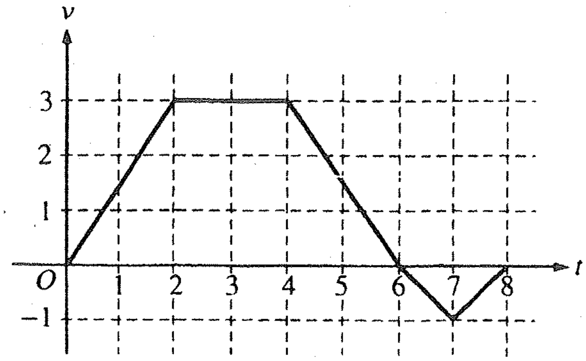
Review Worksheet for Quiz 3.4 - 3.6

Calculus

Name Key Hr



(1) A bug begins to crawl up a vertical wire at time $t = 0$. The velocity v of the bug at time t, $0 \le t \le 8$, is given by the function whose graph is shown above.

At what value of t does the bug change direction? when v switches from + to −

(A) 2 (B) 4 (C) 6 (D) 7 (E) 8

(2) The position of a particle moving along a straight line at any time t is given by $s(t) = 2t^3 - 4t^2 + 2t - 1$. What is the acceleration of the particle when $t = 2$?

$V = 6t^2 - 8t + 2$

$a = 12t - 8$

$a(2) = 12(2) - 8 = 24 - 8 =$

(A) 32
(B) 16
(C) 8
(D) 4
(E) 0

(3) A particle moves along the x-axis so that its position at time t is given by $x(t) = t^2 - 6t + 5$. For what value of t is the velocity of the particle zero?

$v(t) = 2t - 6 = 0$

$2t = 6$

$t = 3$

(A) 1 (B) 2 (C) 3 (D) 4 (E) 5

(4) If $y = \tan x - \cot x$, then $\frac{dy}{dx} = \sec^2 x - -\csc^2 x = \sec^2 x + \csc^2 x$

(A) $\sec x \csc x$ (B) $\sec x - \csc x$ (C) $\sec x + \csc x$ (D) $\sec^2 x - \csc^2 x$ (E) $\sec^2 x + \csc^2 x$

(5) If $f(x) = (x^2 - 2x - 1)^{\frac{2}{3}}$, then $f'(0)$ is

(A) $\frac{4}{3}$ (B) 0 (C) $-\frac{2}{3}$ (D) $-\frac{4}{3}$ (E) -2

$f'(x) = \frac{2}{3}(x^2 - 2x - 1)^{-1/3} \cdot (2x - 2)$

$f'(0) = \frac{2}{3}(0^2 - 2\cdot 0 - 1)^{-1/3}(2\cdot 0 - 2) = \frac{2}{3}(-1)^{-1/3}(-2) = -\frac{4}{3} \cdot \frac{1}{(-1)^{1/3}} = -\frac{4}{3} \cdot -1$

$= \frac{4}{3}$

(6) An equation of the line tangent to the graph of $y = \cos(2x)$ at $x = \frac{\pi}{4}$ is

(A) $y - 1 = -\left(x - \frac{\pi}{4}\right)$

(B) $y - 1 = -2\left(x - \frac{\pi}{4}\right)$

(C) $y = 2\left(x - \frac{\pi}{4}\right)$

(D) $y = -\left(x - \frac{\pi}{4}\right)$

(E) $y = -2\left(x - \frac{\pi}{4}\right)$

$y' = -\sin(2x) \cdot 2$

$y'(\pi/4) = -2\sin\left(2 \cdot \frac{\pi}{4}\right)$

$= -2\sin(\pi/2)$

$= -2(1) = \underline{\underline{-2 = m}}$

$y - 0 = -2\left(x - \frac{\pi}{4}\right)$

$y = -2\left(x - \frac{\pi}{4}\right)$

$x = \frac{\pi}{4}$ $y = 0$

$y = \cos\left(2 \cdot \frac{\pi}{4}\right)$

$y = 0$

(7) If $f(x) = (x-1)^2 \sin x$, then $f'(0) =$

(A) -2 (B) -1 (C) 0 (D) 1 (E) 2

$f'(x) = 2(x-1)' \cdot 1$ $f'(0) = 2(0-1) = -2$

(8) If $y = \cos^2 3x$, then $\frac{dy}{dx} =$ $2(\cos(3x))' \cdot -\sin(3x) \cdot 3 = -6\cos(3x)\sin(3x)$

(A) $-6\sin 3x \cos 3x$ (B) $-2\cos 3x$ (C) $2\cos 3x$

(D) $6\cos 3x$ (E) $2\sin 3x \cos 3x$

$(\cos(3x))^2$

$y' = 2 \cdot -\sin\left(\frac{x}{2}\right) \cdot \frac{1}{2} = -\sin\frac{x}{2}$

$y'' = -\cos\left(\frac{x}{2}\right) \cdot \frac{1}{2} = -\frac{1}{2}\cos\left(\frac{x}{2}\right)$

9. If $y = 2\cos\left(\frac{x}{2}\right)$, then $\frac{d^2y}{dx^2} =$

(A) $-8\cos\left(\frac{x}{2}\right)$ (B) $-2\cos\left(\frac{x}{2}\right)$ (C) $-\sin\left(\frac{x}{2}\right)$ (D) $-\cos\left(\frac{x}{2}\right)$ (E) $-\frac{1}{2}\cos\left(\frac{x}{2}\right)$

10. If $y = \cos^2 x - \sin^2 x$, then $y' =$

(A) -1 (B) 0 (C) $-2\sin(2x)$ (D) $-2(\cos x + \sin x)$ (E) $2(\cos x - \sin x)$

$y' = 2\cos x \cdot -\sin x - 2\sin x \cdot \cos x$

$= -4\sin x\cos x$ ok

identity

but $\boxed{\sin(2x) = 2\sin x\cos x}$

so $-4\sin x\cos x = -2\sin(2x)$

11. If $f(x) = \sin x$, then $f'\left(\frac{\pi}{3}\right) =$

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

$f'(x) = \cos x$

$f'\left(\frac{\pi}{3}\right) = \cos\frac{\pi}{3} = \frac{1}{2}$