

PRINTABLE VERSION

Quiz 25

$$y'(t) / x'(t)$$

You scored 0 out of 100

Question 1

You did not answer the question.

Find the slope of the tangent line to the curve $x(t) = \cos^3(2t)$, $y(t) = \sin^3(2t)$ at the point where $t = \frac{\pi}{3}$.

$$y'(t) = 3 \sin^2(2t) (2 \cos(2t))$$

$$y'(\pi/3) = 6 \sin^2(2\pi/3) \cdot \cos(2\pi/3) = 6 \left(\frac{3}{4}\right) \left(-\frac{1}{2}\right)$$

$$x'(t) = 3 \cos^2(2t) (-2 \sin(2t))$$

$$x'(\pi/3) = -6 \left(\frac{1}{4}\right) \left(\frac{\sqrt{3}}{2}\right)$$

$$\frac{-18/8}{-6\sqrt{3}/8} = \frac{3}{\sqrt{3}} = \sqrt{3}$$

a) $-3\sqrt{3}$

b) $\sqrt{3}$

c) $2\sqrt{3}$

d) $\frac{\sqrt{3}}{3}$

e) $-\sqrt{3}$

Question 2

You did not answer the question.

Find an equation in x and y for the line tangent to the curve $x(t) = 3t$, $y(t) = \cos(\pi t)$ at the point where $t = 3$.

$$y'(t) = -\pi \sin(\pi t) ; y'(3) = -\pi \sin(3\pi) = 0$$

$$x'(t) = 3$$

$$m = 0/3 = 0$$

$$y - y(3) = 0(x - x(3))$$

$$y + 1 = 0$$

a) $6x = 0$

b) $3x - 3 = 0$

c) $x = -1$

d) $y = -1$

e) $y = 2$

Question 3

You did not answer the question.

Find an equation in x and y for the line tangent to the curve $x(t) = t - 2$, $y(t) = t^4$ at the point $(0, 16)$.

$$0 = t - 2 \quad 16 = t^4$$

$$2 = t \quad 2 = t$$

- a) $32x - y + 16 = 0$
- b) $32x + y + 112 = 0$
- c) $32x + y + 16 = 0$
- d) $-32x + y + 16 = 0$
- e) $8x - y + 48 = 0$

$$y'(t) = 4t^3 \quad y'(2) = 32$$

$$x'(t) = 1 \quad x'(2) = 1$$

$$m = \frac{32}{1}$$

$$y - 16 = 32(x - 0)$$

Question 4

You did not answer the question.

Find an equation in x and y for the line tangent to the curve $x(t) = \frac{2}{t}$, $y(t) = t^2 + 2$ at the point $(1, 6)$.

$$1 = \frac{2}{t} \quad 6 = t^2 + 2$$

$$t = 2 \quad 4 = t^2$$

$$+2 = t$$

- a) $2x + \frac{5}{2} = 0$
- b) $4x - \frac{11}{2} + \frac{1}{4}y = 0$
- c) $2x - \frac{5}{2} = 0$
- d) $4x - 7 + \frac{1}{2}y = 0$
- e) $-4x + 3 = 0$

$$y'(t) = 2t$$

$$y'(2) = 4$$

$$x'(t) = \frac{-2}{t^2}$$

$$x'(2) = \frac{-2}{4} = -\frac{1}{2}$$

$$y - 6 = \frac{4}{(-1/2)}(x - 1)$$

$$y - 6 = -8(x - 1)$$

$$y - 6 = -8x + 8$$

$$8x + y - 14 = 0 \div 2$$

Question 5

You did not answer the question.

Find an equation in x and y for the line tangent to the polar curve $r = 12 - 6 \sin(\theta)$ at $\theta = 0$.



- $y - 0 = -2(x - 12)$
- a) $y = 4x + 24$ $y = -2x + 24$ $x(\theta) = r \cos \theta = (12 - 6 \sin \theta) \cos \theta$ $x(0) = 12$
 $x(\theta) = 12 \cos \theta - 6 \sin \theta \cos \theta$
- b) $y = -2x + 24$ $y(\theta) = r \sin \theta = (12 - 6 \sin \theta) \sin \theta$
- c) $y = 6x - 1$ $y(\theta) = 12 \sin \theta - 6 \sin^2 \theta$ $y(0) = 0$
- d) $y = -2x - 12$ $x'(\theta) = -12 \sin \theta - 6 \cos^2 \theta + 6 \sin^2 \theta$
- e) $y = -3x + 6$ $x'(0) = 0 - 6 + 0 = -6$ $m = \frac{12}{-6}$

Question 6

$$y'(\theta) = 12 \cos \theta - 12 \sin \theta \cos \theta = -2$$

$$y'(0) = 12 - 0$$

You did not answer the question.

Find an equation in x and y for the line tangent to the polar curve $r = 5 \cos(2\theta)$ at $\theta = \frac{\pi}{2}$.

just like #5

- a) $y = x + 5$
- b) $y = -5$
- c) $x = 5$
- d) $y = 2x - 5$
- e) $y = -6$

Question 7

You did not answer the question.

Parametrize the curve $y = -3x^3$ by a pair of differentiable functions $x = x(t)$, $y = y(t)$ with $[x'(t)]^2 + [y'(t)]^2 \neq 0$ then determine the tangent line at the origin.

$(0, 0)$

- a) $x(t) = t, y(t) = -3t^3$; tangent line: $x = 0$
- b) $x(t) = t^2, y(t) = -3t^3$; tangent line: $x = 0$
- c) $x(t) = -3t^3, y(t) = t$; tangent line: $y = -1$
- d) $x(t) = -3t^3, y(t) = t$; tangent line: $y = 0$
- e) $x(t) = t, y(t) = -3t^3$; tangent line: $y = 0$

$$x(t) = t \quad x'(t) = 1 \quad x'(0) = 1$$

$$y(t) = -3t^3 \quad y'(t) = -9t^2 \quad y'(0) = 0$$

$$m = \frac{0}{1} = 0$$

$$y - 0 = 0(x - 0)$$

$$y = 0$$

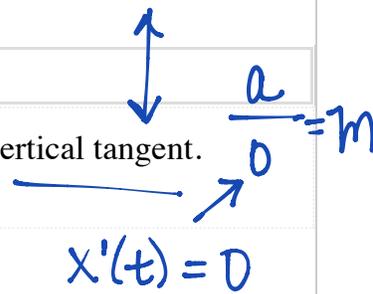
$$\text{if } m = \frac{1}{0} \Rightarrow \text{eq. of}$$

tang. $x = \frac{a}{0} = m$

Question 8

You did not answer the question.

Find the points (x, y) at which the curve $x(t) = t^2 - 12t$, $y(t) = t^3 - 12t$ has a vertical tangent.



- a) $(-11, 1)$
- b) $(12, 2)$
- c) $(11, -3)$
- d) $(-36, 144)$
- e) $(-12, 3)$

$$x'(t) = 2t - 12$$

$$2t - 12 = 0$$

$$t = 6$$

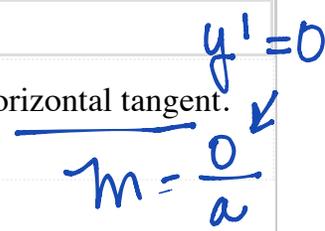
$$x(6) = 36 - 72 = -36$$

$$y(6) = 216 - 72 = 144$$

Question 9

You did not answer the question.

Find the points (x, y) at which the curve $x(t) = 11 \cos(t)$, $y(t) = 11 \sin(2t)$ has a horizontal tangent.



$$y'(t) = 22 \cos(2t)$$

$$22 \cos(2t) = 0$$

$$\cos(2t) = 0$$

$$2t = \pi/2, 3\pi/2, 5\pi/2$$

$$t = \pi/4, 3\pi/4, 5\pi/4, 7\pi/4$$

- a) $\left(\frac{11\sqrt{2}}{2}, 22\right), \left(\frac{-11\sqrt{2}}{2}, 22\right), \left(\frac{11\sqrt{2}}{2}, -22\right), \text{ and } \left(\frac{-11\sqrt{2}}{2}, -22\right)$
- b) $\left(\frac{11\sqrt{2}}{4}, 11\right), \left(\frac{-11\sqrt{2}}{4}, 11\right), \left(\frac{11\sqrt{2}}{4}, -11\right), \text{ and } \left(\frac{-11\sqrt{2}}{4}, -11\right)$
- c) $\left(\frac{11\sqrt{2}}{2}, \frac{11}{2}\right), \left(\frac{-11\sqrt{2}}{2}, \frac{11}{2}\right), \left(\frac{11\sqrt{2}}{2}, -\frac{11}{2}\right), \text{ and } \left(\frac{-11\sqrt{2}}{2}, -\frac{11}{2}\right)$
- d) $\left(\frac{11\sqrt{2}}{2}, 11\right), \left(\frac{-11\sqrt{2}}{2}, 11\right), \left(\frac{11\sqrt{2}}{2}, -11\right), \text{ and } \left(\frac{-11\sqrt{2}}{2}, -11\right)$
- e) $(11\sqrt{2}, 11), (-11\sqrt{2}, 11), (11\sqrt{2}, -11), \text{ and } (-11\sqrt{2}, -11)$

$$x(\pi/4) = 11(\sqrt{2}/2)$$

$$y(\pi/4) = 11(1) = 11$$

Question 10

You did not answer the question.

Find the points (x, y) at which the curve $x(t) = 3 - \sin(t)$, $y(t) = 5 + 2 \cos(t)$ has a vertical tangent.

$$x'(t) = -\cos t$$

- a) (-2, 0) and (3, 1)
- b) (3, 2) and (-1, -3)
- c) (3, 1) and (1, 3)
- d) (2, 5) and (4, 5)
- e) (2, -2) and (2, 3)

$$-\cos t = 0$$

$$\cos t = 0$$

$$t = \pi/2, 3\pi/2$$

$$x(\pi/2) = 3 - 1 = 2 \quad y(\pi/2) = 5$$

$$x(3\pi/2) = 3 + 1 = 4 \quad y(3\pi/2) = 5$$