

Trigonometry Review

1. Find $\frac{dy}{dx}$ a) $y = \cos(-4x)$ b) $y = \sin(3x + 2\pi)$ c) $y = \sin(x^2)$

d) $y = \cos(x^2 - 2)^2$ e) $y = x \cos x$ f) $y = \frac{x}{\sin x}$

g) $y = \frac{\sin x}{1 + \cos x}$ h) $y = \sin(\cos x)$ i) $y = \cos^3(\sin x)$

j) $y = \frac{1 + \sin x}{1 - \sin 2x}$ k) $\sin y = \cos 2x$ l) $x \cos y = \sin(x + y)$

2. At what points on the curve $y = \sin x + \cos x$, $0 \leq x \leq 2\pi$, is the tangent line horizontal?
3. Find the equation of the tangent line to $y = \tan x$ when $x = \frac{\pi}{3}$.
4. Find the slope of the tangent line to $x \tan y = y - 1$ when $y = \frac{\pi}{4}$.
5. The length of the hypotenuse of a right triangle is 10 cm. One of the acute angles is decreasing at the rate of $\frac{\pi}{36}$ rad/sec. How fast is the area decreasing when this angle is $\frac{\pi}{6}$.
6. A ladder 5 m long rests against a vertical wall. The bottom of the ladder slides away from the wall at a rate of $\frac{1}{10}$ m/s. How fast is the angle between the ladder and the wall increasing when the bottom of the ladder is 3 m from the wall?
7. Find the local maxima and minima of the following
a) $y = x - 2 \sin x$, $0 \leq x \leq 2\pi$

Solutions

1 a) $-4\sin 4x$ b) $3 \cos(3x + 2\pi)$ c) $2x \cos(x^2)$ d) $-4x(x^2 - 2)\sin(x^2 - 2)^2$ e) $\cos x - x \sin x$

f) $\frac{\sin x - x \cos x}{\sin^2 x}$ g) $\frac{1}{1 + \cos x}$ h) $-\sin x \cos(\cos x)$ i) $-3 \cos x \sin(\sin x) \cos^2(\sin x)$

j) $\frac{\cos x - \cos x \sin 2x + 2 \cos 2x + 2 \sin x \cos 2x}{(1 - \sin 2x)^2}$ k) $-\frac{2 \sin 2x}{\cos y}$ l) $\frac{\cos y - \cos(x + y)}{x \sin y + \cos(x + y)}$

2. $(\frac{\pi}{4}, \frac{2}{\sqrt{2}}), (\frac{5\pi}{4}, -\frac{2}{\sqrt{2}})$ 3. $12x - 3y + 3\sqrt{3} - 4\pi = 0$ 4. $\frac{2}{6 - \pi}$ 5. $\frac{25\pi}{36}$ 6. 0.025 rad/s

7. $(\frac{\pi}{3}, \frac{\pi}{3} - \sqrt{3})$ min, $(\frac{5\pi}{3}, \frac{5\pi}{3} + \sqrt{3})$ max.