

Calculus I
Practice Problems 3

1. A point moves around the unit circle so that the angle it makes with the x -axis at time t is $\theta(t) = (t^2 + t)\pi$. Let $(x(t), y(t))$ be the cartesian coordinates of the point at time t . What is dy/dt when $t = 3$?
2. Find the derivative: $f(x) = \sin x \cos x$
3. Find the derivative: $g(x) = \frac{\sin x}{\cos x}$
4. Let $f(x) = x \sin x$. Find the equation of the tangent line to the graph $y = f(x)$ at the points $x = (n + 1/2)\pi$ for any integer n .
5. Consider the curves $C_1 : y = \sin x$ and $C_2 : y = \cos x$.
 - a) At which points x between $-\pi/2$ and $\pi/2$ do the curves have parallel tangent lines?
 - b) At which such points do they have perpendicular tangent lines?
6. Differentiate: $f(x) = \frac{1 + \tan x}{1 - \tan x}$
7. Let $y = x + 25x^{-1}$. Find an approximate value of y when $x = 3.2$.
8. Find an approximate value of $\tan(.26\pi)$.
9. Find the equation of the tangent line to $y = x^2(x^3 - 1)$ at $(2, 28)$.
10. Find the equation of the tangent line to the curve $y = x \cos x$ at $(\pi/4, \pi\sqrt{2}/8)$.