

MATH 100 – WORKSHEET 6
THE PRODUCT RULE; TRIG FUNCTIONS

1. DIRECT PROBLEMS

Fact. $(fg)' = f'g + fg'$, $\left(\frac{f}{g}\right)' = \frac{f'g - fg'}{g^2}$, $(\sin x)' = \cos x$, $(\cos x)' = -\sin x$.

(1) Differentiate

(a) $\tan x = \frac{\sin x}{\cos x}$. Using the ratio rule, $\frac{d}{dx} \tan x =$

(b) $f(x) = \frac{x^2 + xe^x}{\cos x + \sin x}$. $f'(x) =$

(c) $f(x) = \frac{x^2 + A}{\sqrt{x}}$. $f'(x) =$

2. DERIVATIVES, LIMITS, AND SLOPES

(1) What is $\lim_{h \rightarrow 0} \frac{\sin h}{h}$?

(2) What is the equation of the line tangent to the graph $y = T \sin x + \cos x$ at the point where $x = \frac{\pi}{4}$?

(3) Let $f(x) = \frac{g(x)}{x}$, where $g(x)$ is differentiable near $x = 1$. The line $y = 2x - 1$ is tangent to the graph $y = f(x)$ at $x = 1$. Find $g(1)$ and $g'(1)$.