

Calculus 1510 Tutorial #5

1. Find  $\frac{dy}{dx}$  if: DO NOT SIMPLIFY.

(a)  $y \tan x^2 = x \tan y^2$

(b)  $y = \sin\left(\sin\left(\sin\left(e^{x^2+x}\right)\right)\right)$

(c)  $y = \cos x(\cos x^3)$

(d)  $y = \cos(\cos x^3)$

(e)  $y = \log_5 \frac{\sin x}{x}$

(f)  $y = e^{5x} \ln(2 - x^2)$

2. Find  $f'(1)$  if  $f(1) = 0$  and  $f(x) + x \cos f(x) = x^2$ .

3. Find the limit, if it exists.

(a)  $\lim_{x \rightarrow 0} \frac{\tan(6x)}{\sin(2x)}$

(b)  $\lim_{x \rightarrow \frac{\pi}{4}} \frac{\sin x - \cos x}{\cos(2x)}$

(c)  $\lim_{x \rightarrow 1} \frac{x^2 + x - 2}{\sin(x - 1)}$

4. Find  $f^{(21)}(x)$  if  $f(x) = \sin(2x)$

5. Find  $\frac{d^n y}{dx^n}$  if  $y = xe^x$ .

6. The tangent line to the graph of  $f(x) = \sqrt[3]{x-2}$  at the point  $T(3,1)$  intersects the graph of  $f$  at another point  $P$ . Find the coordinates of  $P$ .