

1) Given  $y = f(x)$ , determine  $\frac{dy}{dx} = f'(x) = y'$ . **Do Not Simplify!!!!**

a)  $f(x) = \sin(2^x)$

b)  $y = 4^{1-x^3}$

c)  $y = \tan^{-1}(\ln x)$

d)  $y = \pi^x x^\pi$

e)  $y = \sqrt{\frac{1-x}{\cos x}}$

2) Given:  $x \sin y = \ln(xy)$ , find  $y'$ . (You must simplify, solve for  $y'$  for credit)

3) Linearize  $f(x) = \sqrt{\ln x}$  for  $x = e$ .

4) A particle moves on a vertical line so that its coordinate at time  $t$  is  $y = t^3 - 12t + 3$ ,  $t > 0$ .

a) Find the velocity function.

b) Find the acceleration function.

c) Determine when the object is moving upward.

5) For  $f(x) = x - x^2$ , determine:

a)  $\Delta y = f(x + \Delta x) - f(x)$

b)  $dy$

c)  $\Delta y - dy$