

You have 20 minutes to complete the quiz. No calculators.

Name: _____

1. (2 points) Find y' if $ye^y = x$.

Solution. Half point for taking logarithms correctly:

$$\ln y + y = \ln x.$$

Full point for differentiating correctly:

$$\frac{1}{y}y' + y' = \frac{1}{x}.$$

Half point for solving for y' correctly:

$$y' = \frac{y}{(y+1)x} = \frac{1}{(y+1)e^y}$$

Other acceptable forms for the derivative:

$$y' = \frac{1}{e^y + ye^y}$$

$$y' = \frac{\frac{1}{x}}{1 + \frac{1}{y}}$$

$$y' = \frac{1}{x + \frac{x}{y}}$$

$$y' = \frac{1}{x + e^y}$$

□

2. (3 points) 1 point per part.

- (a) Find the differential dy .

Solution.

$$dy = e^{\sin x} \cos x dx.$$

□

- (b) Evaluate dy for $x = 0$ and $dx = 0.1$.

Solution.

$$dy = e^{\sin 0} \cos 0 \cdot 0.1 = 0.1.$$

□

- (c) Use part (b) to approximate $e^{\sin(0.1)}$.

Solution. Since $f(x+dx) \approx f(x) + f'(x)dx = f(x) + dy$,¹

$$e^{\sin 0.1} \approx e^{\sin 0} + dy = 1 + 0.1 = 1.1.$$

□

¹When we speak of $dx = 0.1$, we really mean $\Delta x = 0.1$, and so the approximation formula is better written as $\Delta y \approx f'(x)\Delta x$.