

Paul Smith

TMA MST204 01 Part I

mistake!
This is $(y+5)$!

$$1) a) \log(y+3) - \log(y+5) = \log \frac{3}{5} = \log(e^x) + \log \frac{3}{5}$$

$$\log \frac{y+3}{y+5} = \log \left(\frac{3e^x}{5} \right)$$

Take the exponential of both sides

$$\frac{y+3}{y+5} = \frac{3e^x}{5}$$

$$y+3 = \frac{3ye^x}{5} - 3e^x$$

$$y - \frac{3ye^x}{5} = -3 - 3e^x$$

$$y(1 - \frac{3e^x}{5}) = -3 - 3e^x$$

$$y(5 - 3e^x) = -3 - 3e^x$$

$$y = \frac{-15 - 15e^x}{5 - 3e^x} = \frac{15e^x + 15}{3e^x - 5}$$

I'm not sure what is meant by 'subject' so I'll express x in terms of y

$$3e^x y - 5y = 15e^x + 15$$

$$-5y - 15 = 15e^x - 3e^x y$$

$$-5y - 15 = e^x(15 - 3y)$$

$$e^x = \frac{-5y - 15}{15 - 3y} = \frac{15 + 5y}{3y - 15}$$

$$x = \log \left(\frac{15 + 5y}{3y - 15} \right)$$

slight error above.

But your first interpretation was correct

b) $x^2 + y^3 = 5$
differentiate with respect to x
 $2x + 3y^2 \frac{dy}{dx} = 0$

$$3y^2 \frac{dy}{dx} = -2x$$

x is the independent variable
 y is the dependent variable
and is what you want to find.