MATH 1300 B
QUIZ #3b
SOLUTIONS

1. Differentiate $y = \sqrt{x} + \frac{1}{\sqrt[3]{x}}$.

   Answer:
   $\frac{dy}{dx} = \frac{d}{dx}(\sqrt{x} + \frac{1}{\sqrt[3]{x}}) = \frac{d}{dx}(\sqrt{x}) + \frac{d}{dx}(\frac{1}{\sqrt[3]{x}})$
   $= \frac{1}{2\sqrt{x}} - \frac{1}{3x\sqrt[3]{x}}$.

2. Find the equation of the tangent line to the graph of the function $y = f(x)$ given implicitly by the equation $xy^2 + x^2y = 2$, at the point $(1, -2)$.

   Answer:
   $\frac{d}{dx}(xy^2 + x^2y) = \frac{d}{dx}(2)$
   $y^2 + 2xy\frac{dy}{dx} + 2xy + x^2\frac{dy}{dx} = 0.$
   $\frac{dy}{dx} = -\frac{2xy + y^2}{2xy + x^2}$.
   So, at the point $(1, -2)$
   $\frac{dy}{dx} = -\frac{2(1)(-2) + (-2)^2}{2(1)(-2) + 1^2} = -\frac{0}{-3} = 0.$
   Hence, the slope of the tangent line at the point $P = (1, -2)$ is zero, and consequently the equation of the tangent line is
   $y - (-2) = 0(x - 1)$,
   $y + 2 = 0$
   or $y = -2$.

The end