MATH 114: Quiz #4 – SOLUTIONS

/4 **Problem 1:** Find $\dfrac{dy}{dx}$ given that

$$e^{x/y} = x - y.$$

Implicit differentiation:

$$e^{x/y}\left(y^{-1} - xy^{-2}y'\right) = 1 - y'$$

$$\implies y' - xy^{-2}e^{x/y}y' = 1 - y^{-1}e^{x/y}$$

$$\implies \boxed{y' = \frac{1 - y^{-1}e^{x/y}}{1 - xy^{-2}e^{x/y}}}$$

/4 **Problem 2:** Find an equation for the tangent line to the graph of

$$xy^2 + y^3 = 2$$

at the point $(1, 1)$.

Implicit differentiation:

$$y^2 + 2xyy' + 3y^2y' = 0$$

Evaluate at $(1, 1)$:

$$1 + 2y' + 3y' = 0 \implies y' = -\frac{1}{5}.$$

Use point-slope form for tangent line:

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

$$\implies \boxed{y = -\frac{1}{5}x + \frac{6}{5}}$$