

**Handout 2 – Extra Homework 1**

For the following autonomous differential equations, use the linearization theorem to classify the given equilibrium point as a source or sink. If the linearization theorem is inconclusive or cannot be applied, simply say so.

**Exercise 1.**

$$\frac{dy}{dt} = y^3 - 13y + 18; \text{ equilibrium point } y_0 = 2.$$

**Exercise 2.**

$$\frac{dy}{dt} = \tan y; \text{ equilibrium point } y_0 = 7\pi.$$

**Exercise 3.**

$$\frac{dy}{dt} = y - 1 - \frac{5}{y} - \frac{3}{y^2}; \text{ equilibrium point } y_0 = -1.$$

**Exercise 4.**

$$\frac{dy}{dt} = ye^{-8y}; \text{ equilibrium point } y_0 = 0.$$

**Exercise 5.**

$$\frac{dy}{dt} = \sqrt{|y|}; \text{ equilibrium point } y_0 = 0.$$