Math 218 — Assignment 1

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Due 2024/09/13

1. Find all functions $f(x)$ such that

$$x^{0.2024}\frac{df}{dx} + \frac{1}{\cos(f(x))} = 0$$

for $0 < x < \frac{\pi}{2}$.

2. Solve

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

for $x > 0$. (This problem is in the course notes, which you can check if you want to. Your solution should be more detailed than what's written there.)

3. Let $y = y(t)$ be a function of time t, and let $\dot{y} := \frac{dy}{dt}$ denote its derivative. Draw a direction field for the differential equation

$$\dot{y} = (y+1)(4-y)$$

and describe y's behaviour as $t \to \infty$ in terms of the initial value $y(0)$. (The convention of denoting derivatives with respect to time with a dot is common in physics.)