Math 415A: Direction Fields to Some Problems from Section 2.1

The direction fields are produced using Dfield, a very nice java applet for visualizing direction fields. The applet can be found on http://math.rice.edu/ dfield/dfpp.html through the courtesy of Prof. John C. Polking from Rice University.

Problem 2.1.1.

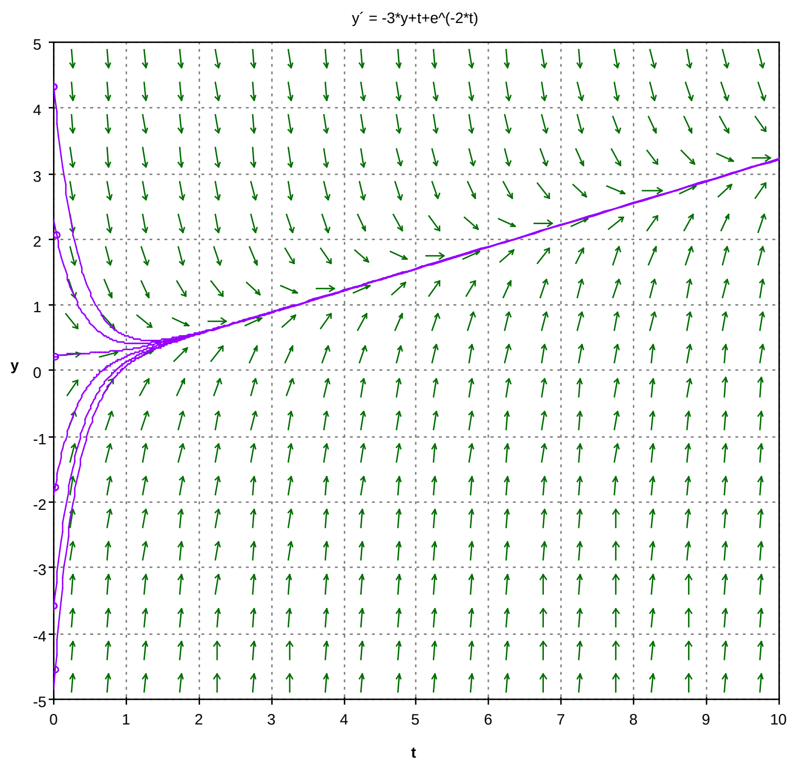

Figure 1: As $t \to \infty$, $y(t)$ approaches the line $\dfrac{t}{3} - \dfrac{1}{9}$ asymptotically regardless of the initial value $y(0)$.

Problem 2.1.2.

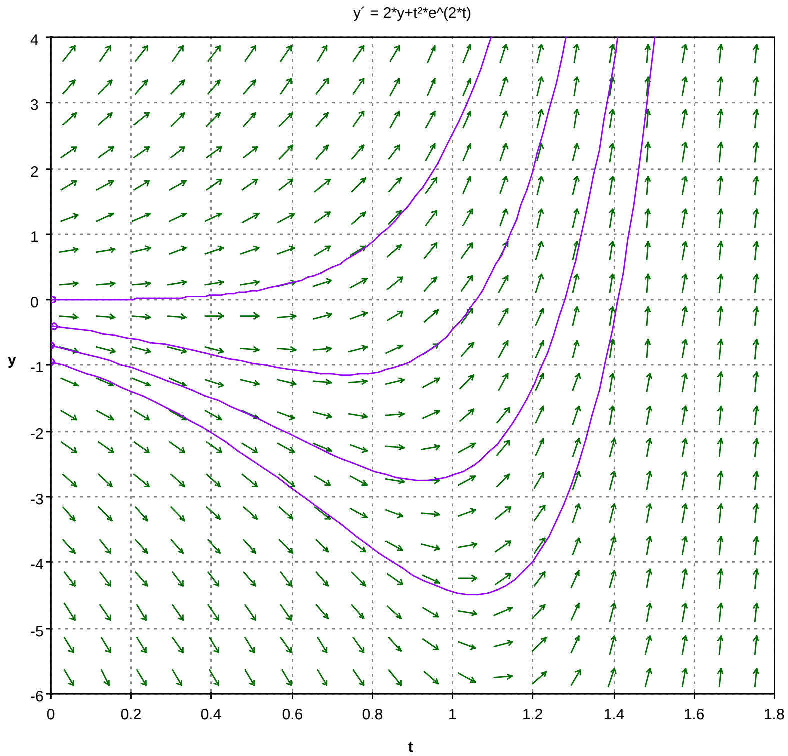

Figure 2: As $t \to \infty$, $y(t)$ approaches $+\infty$ regardless of the initial value $y(0)$.

Problem 2.1.3.

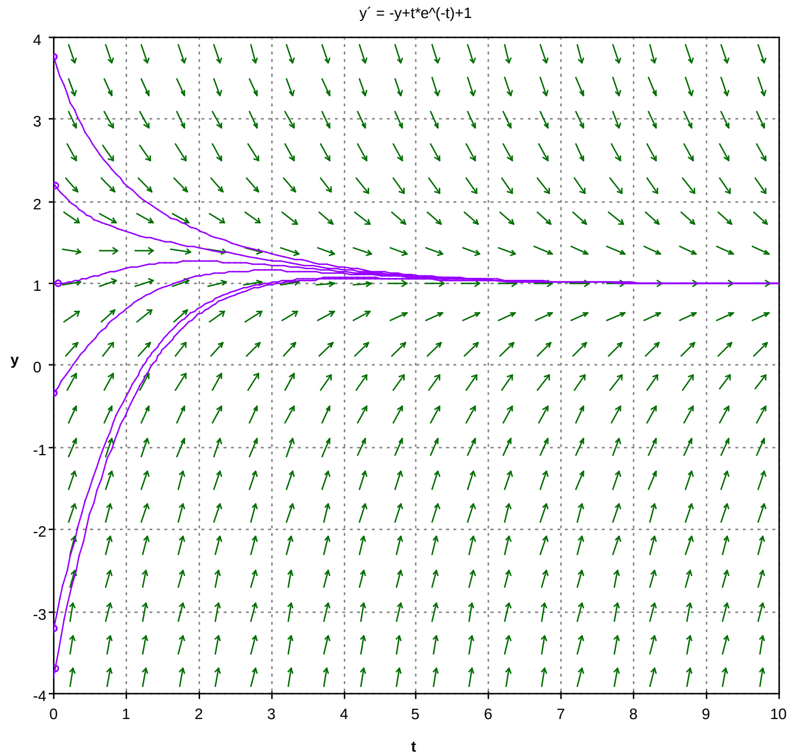

Figure 3: As $t \to \infty$, $y(t)$ approaches the the horizontal line $y = 1$ regardless of the initial value $y(0)$.

Problem 2.1.4.

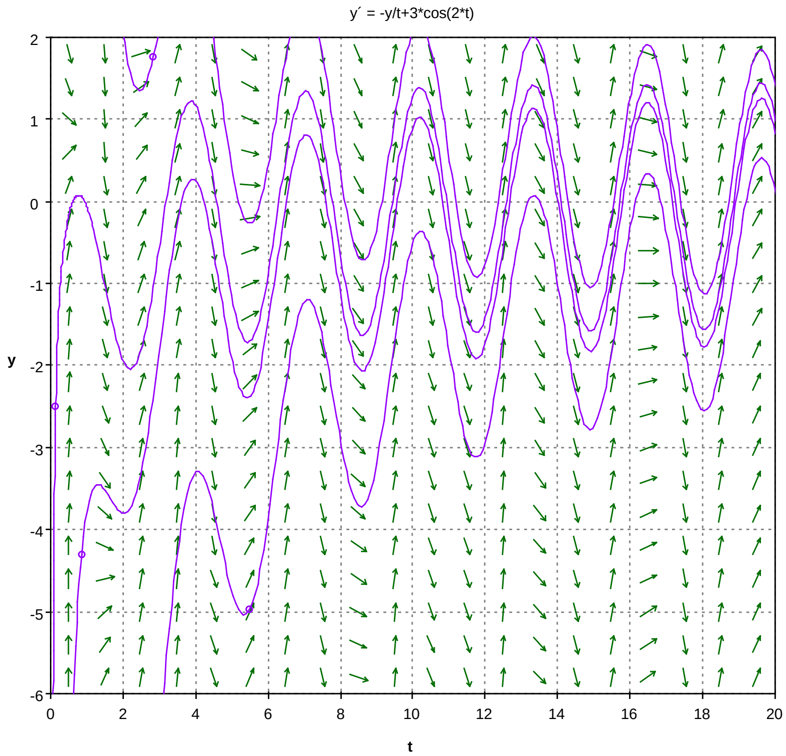

Figure 4: As $t \to \infty$, $y(t)$ approaches the function $\dfrac{3\sin 2t}{2}$ asymptotically regardless of its initial value. In particular, it exhibits oscillating behavior eventually.

Problem 2.1.5.

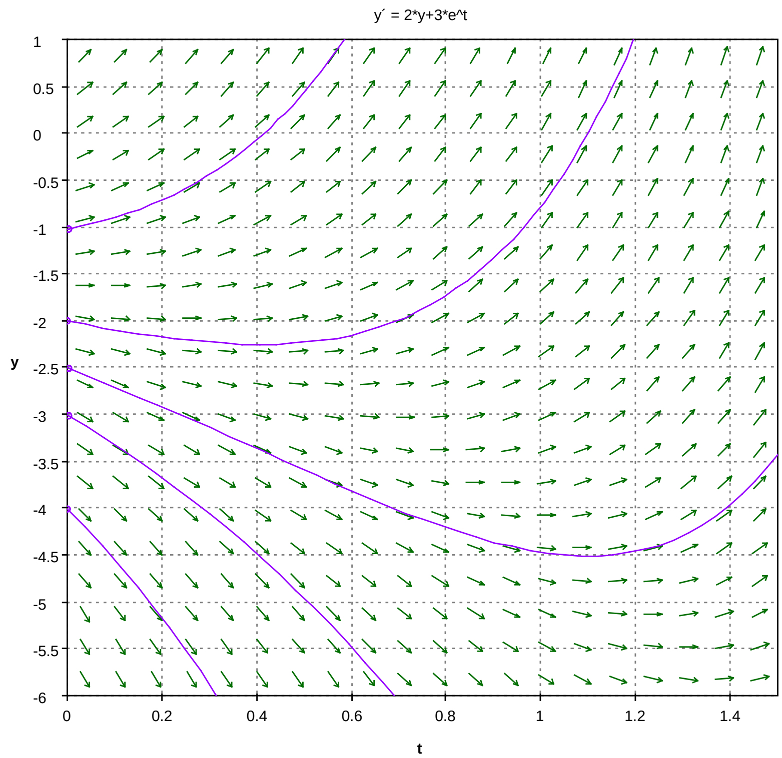

Figure 5: Depending on whether $y(0) \leq -3$ or $y(0) > -3$, $y(t)$ approaches either $-\infty$ or $+\infty$ as $t \to \infty$.

Problem 2.1.10.

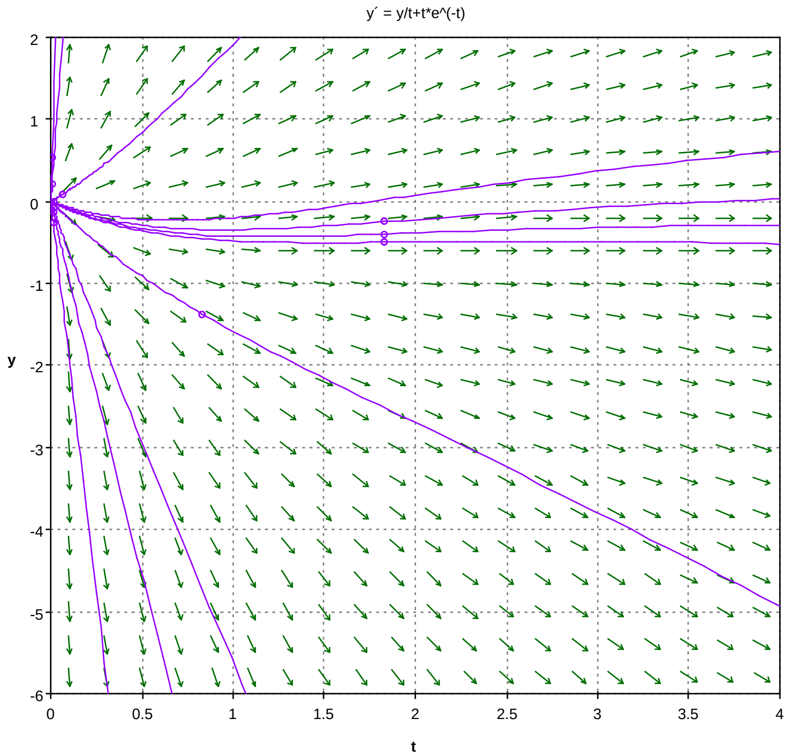

Figure 6: Depending on its initial value, $y(t)$ approaches either $+\infty$, 0, or $-\infty$.

Problem 2.1.11.

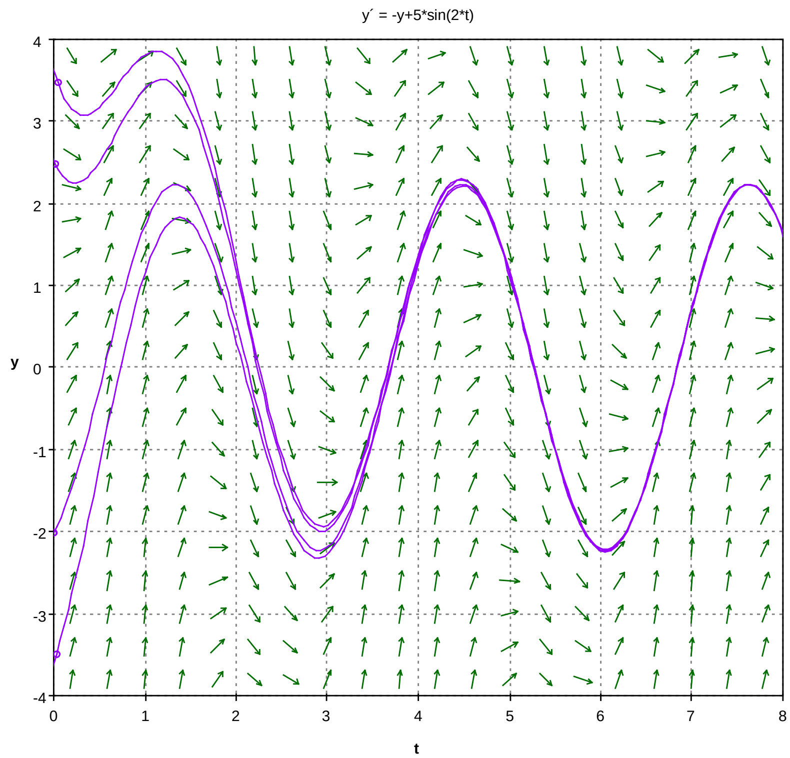

Figure 7: As $t \to \infty$, $y(t)$ approaches the function $\sin 2t - 2\cos 2t$ asymptotically regardless of its initial value. In particular, it displays oscillating behavior eventually.

Problem 2.1.12.

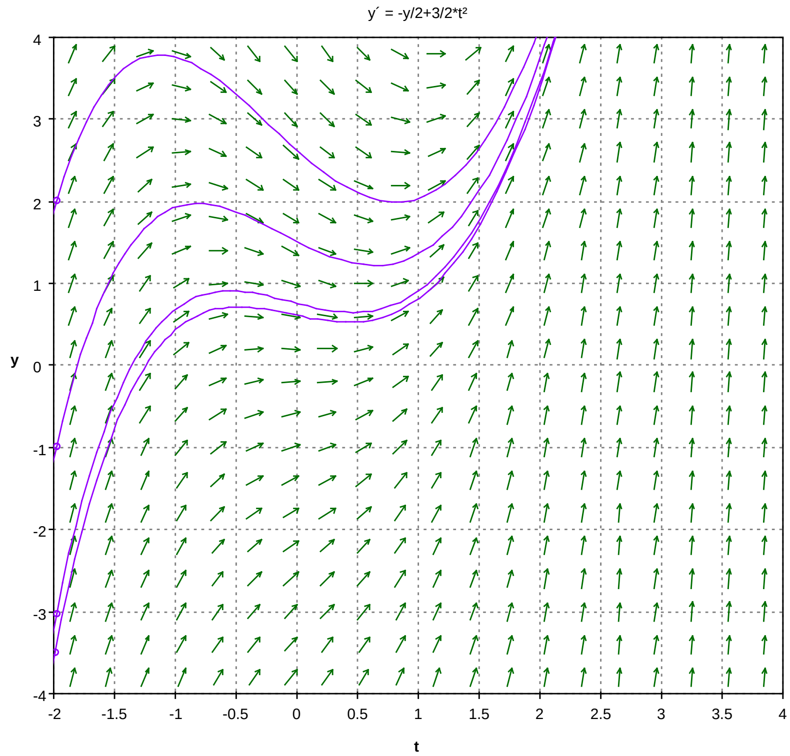

Figure 8: As $t \to \infty$, $y(t)$ approaches the function $3t^2 - 12t + 24$ asymptotically regardless of its initial value. In particular, it approaches $+\infty$ eventually.