

1. (1 point) Draw a direction field for the differential equation $y' = x - y^2$, only on the square consisting of the 9 points: $(-1, -1), (-1, 0), (-1, 1), (0, -1), (0, 0), (0, 1), (1, -1), (1, 0), (1, 1)$.

2. (1 point) Suppose $y_1 = f_1(x)$ and $y_2 = f_2(x)$ are two solutions to the differential equation

$$2y'' + 5y' = y$$

Show that $y = y_1 + 6y_2$ is also a solution.

(turn over)

3. (1 point) Global Warming! Let $y(t)$ be the number of kilograms of Arctic ice after t days. Suppose that if the air stays at a fixed Fahrenheit temperature T , Arctic ice melts at a rate of $10,000T/y$ kilograms per day. If there are 1,000,000 kilograms of Arctic ice right now, what is the least temperature T needed for all the Arctic ice to melt within 100 days?