

2.1 #31

The solution to the differential equation is $y = (-2t - \frac{4}{3} - 4e^t) + (y_0 + \frac{16}{3})e^{\frac{3t}{2}}$.
Note that the term not in the parenthesis dominates.

Hence y will grow positively as $t \rightarrow \infty$ if $(y_0 + \frac{16}{3}) > 0$ and negatively if $(y_0 + \frac{16}{3}) < 0$.

Therefore $y_0 = -\frac{16}{3}$ separates the types of solutions.

For $y_0 = -\frac{16}{3}$; $y = (-2t - \frac{4}{3} - 4e^t)$.