HW5, due tomorrow:
7555 #9
7572 #1.2

Exam 1 tomorrow: Tate Lab 150,
5-6 or 6:05 - 7:05

Office hours: tomorrow 1 - 2:15

Example 1. Solve the initial value problem

\[ \frac{dy}{dx} = \frac{4x + 3y}{x + 2y}, \]

\[ y(1) = 1. \]

from Monday (example 3): \( y(1.1) \approx 1.23 \), an overestimate since \( y'' < 0 \) near \( x = 1 \).

Example 2. Find the general solution of the differential equation

\[ y' + 2y = \sin t. \]

This is a linear first-order DE with constant coefficients.

- first, using an integrating factor
- second, using the theorem that says: if you know ONE particular solution, then the general solution is the sum of that particular solution and the general solution of \( y' + 2y = 0 \). Note: this only applies when there are constant coefficients on \( y \) and \( y' \).

Example 3. Are the following vectors linearly independent?

\[
\begin{pmatrix}
1 \\
1 \\
1
\end{pmatrix},
\begin{pmatrix}
2 \\
0 \\
-1
\end{pmatrix},
\begin{pmatrix}
-3 \\
1 \\
3
\end{pmatrix}
\]

Example 4. Find the inverse of the matrix

\[
\begin{bmatrix}
1 & 2 & 1 \\
2 & 1 & 1 \\
1 & 1 & 2
\end{bmatrix}
\]

- first, using Gaussian elimination
- second, using cofactors: The inverse is the transpose of the matrix of cofactors divided by the determinant.
Example 5. Find the general solution of the differential equation $y' = 1 - y^2$, find all equilibrium solutions and determine which are stable.