Exam 2

- **Variation of Parameters**

  If y_1 and y_2 are linearly independent solutions to $y'' + p(t)y' + q(t)y = 0$, then a particular solution to $y'' + p(t)y' + q(t)y = g(t)$ is given by

$$y_p(t) = y_1(t) \int \frac{-g(t)y_2(t)}{W[y_1, y_2](t)}\, dt + y_2(t) \int \frac{g(t)y_1(t)}{W[y_1, y_2](t)}\, dt.$$

- **Reduction of Order**

  If $y_1(t)$ is a solution, not identically zero, to $y'' + p(t)y' + q(t)y = 0$ on I, then

$$y_2(t) = y_1(t) \int \frac{e^{-\int p(t)\, dt}}{(y_1(t))^2}\, dt$$

  is a second, linearly independent solution.

- **A Trigonometric Identity**

$$A\cos\theta + B\sin\theta = C\cos(\theta - \phi) \text{ where } C = \sqrt{A^2 + B^2} \text{ and } \phi = \begin{cases} \arctan(B/A), & A > 0 \\ \arctan(B/A) + \pi, & A < 0, B > 0 \\ \arctan(B/A) - \pi, & A < 0, B < 0 \end{cases}$$