Week 3: Homogeneous Differential Equations

Welcome to the Weekly Review for MATH 2420. This week’s review covers Homogenous Differential Equations. We would like to thank Patrick Bourque and the Spring 2015 MATH 2420 students for allowing us to film the Weekly Reviews.

The following problems are presented in the Week 3 videos. Thank you!

1. The Idea Behind the Homogenous Differential Equations

2. Solve the differential equation:

\[
\frac{dy}{dx} = \frac{y^3 + 2x^3y}{x^2 + y^2}
\]
3. Solve the differential equation:

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

4. Shift to a Homogenous Differential Equation
5. Solve the differential equation:

\[ \frac{dy}{dx} = \frac{x-2y-2}{2x+y+6}, \quad x, y > -2 \]
6. Solve the differential equation:

\[
\frac{dy}{dx} = \frac{x - y - 3}{x + y - 1}
\]
7. Solve the differential equation:

\[(x^2y^2 - 2)dy + xy^3dx = 0\]
8. Solve the differential equation:

\[ \frac{dy}{dx} = (x + y - 4)^2 \]

9. Solve the differential equation:

\[ 2 \frac{dv}{dx} = \sec(2y - 4x + 1) + \tan(2y - 4x + 1) + 4 \]