Week 12: Delta Function and Matrices

Welcome to the Weekly Review for MATH 2420. This week’s review talks about Delta Function and Matrices. 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 12 videos. Thank you!

Part A: Delta Function

1. Definition

2. \[ \int_0^3 e^{t^2} \delta(t - 2) \, dt \]
3. Find $k$ so that \(\int_{0}^{1} \sin^2(\pi(t - k))\delta\left(t - \frac{1}{2}\right) dt = \frac{3}{4}\)

4. Solve \(y'' + y = \delta(t - \pi)\) when \(y(0) = 0\) and \(y'(0) = 0\)
5. Solve \( y'' + 2y' - 3y = \delta(t - 1) - \delta(t - 2) \) when \( y(0) = 2 \) and \( y'(0) = -2 \).

6. Solve \( y'' + y = \sum_{n=0}^{\infty} \delta(t - n\pi) \) where \( y(0) = 0 \) and \( y'(0) = 0 \).
Part B: Matrices

1. What is a linear transformation?

2. Time to draw the house!!

3. Now flip the house!!
4. Find the transformation matrix that will transform the house in (2) to the house in (3). What is the difference between the areas of the houses?
5. Eigenvalues and Eigenvectors.