Week 5: Half-Angle Substitution and Improper Integrals

Welcome to the Weekly Review for MATH 2414. This week’s review talks about Half - Angle Substitution and Improper Integrals. We would like to thank Patrick Bourque and the Spring 2015 MATH 2414 students for allowing us to film the Weekly Reviews.

The following problems are presented in the Week 5 videos. Thank you!

Part A: Half - Angle Substitution

1. Integrate the following

(a) \[ \int \frac{dx}{2 + \cos(x)} \]

(b) \[ \int \frac{dx}{1 + \sin(x) - \cos(x)} \]
Part B: Improper Integrals

1. Improper Integrals

2. Integrate the following

   (a) \( \int_{\sqrt{2}}^{\infty} \frac{x}{4 + x^4} \, dx \)

   (b) \( \int_{0}^{\infty} e^{-\sqrt{x}} \, dx \)
(c) \[ \int_{1}^{\infty} \arctan \left( \frac{1}{x} \right) \, dx \]

(d) \[ \int_{-\infty}^{0} \frac{\arctan(x)}{1 + x^2} \, dx \]
(e) \[ \int_0^2 \frac{dx}{\sqrt{2 - x}} \]

(f) \[ \int_1^\infty \sqrt{\frac{1}{x} + \frac{1}{x^3}} \, dx \]