Math 101 – WORKSHEET 14
TRIGONOMETRIC SUBSTITUTION

1. More trig integrals

Memorize: $\boxed{\sec x = \dfrac{1}{\cos x}, \quad (\tan x)' = \sec^2 x = 1 + \tan^2 x}$.

(1) (even power of secant) Evaluate $\int \tan^5 x \sec^4 x \, dx$ using the substitution $u = \tan x$.

(2) (odd power of tangent) Write $\int \tan^5 x \sec^3 x \, dx$ in the form $\int \sin^n x \cos^m x \, dx$ and evaluate it.

2. TRIG SUBSTITUTION

(1) (Final, 2014) Evaluate $\int \sqrt{4 - x^2}\, dx$

(2) (Final, 2013) Evaluate $\int_{-1}^{1} \frac{dx}{(x^2+1)^3}$

(3) (105 Final, 2014 + 101 Final, 2009) Convert $\int \left(3 - 2x - x^2\right)^{-3/2} dx$ to a trigonometric integral.

(4) (Final, 2008) Find the area inside the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$.