

**EE106 – Engineering Mathematics I**

**Problem Set 8**

Due by 5pm on Friday, 30 November 2018

1. The indefinite integral of  $f(x) = \sec(x)$  is  $F(x) = \ln[\sec(x) + \tan(x)] + C$ , where  $C$  is an arbitrary constant. Prove this by showing that  $F'(x) = f(x)$ .
2. Find the area under the curve  $f(x) = 3 + x - 2/\sqrt{x}$  between 1 and 4.
3. (a) Compute

$$\int_0^3 \frac{3x}{\sqrt{16+x^2}} dx$$

by using the change of variables  $u = 16 + x^2$ .

- (b) Use the trigonometric substitution  $x = 3 \tan(\theta)$  to do the following integral:

$$\int \frac{1}{(x^2 + 9)^{3/2}} dx.$$

4. Compute the integral

$$\int x^2 \cos(1 + 2x^3) dx.$$

(It's up to you to find the necessary change of variables to make this doable.)