MATH1013 – EXAM REVISION DOCUMENT

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Q1. Evaluate the integral

$$\int \sec^3(x)dx.$$

Q2. Evaluate the integral

$$\int \sqrt{1-x^2}dx.$$

Q3. Evaluate the integral

$$\int \sqrt{1+x^2}dx.$$

Q4. Evaluate the integral

$$\int \sqrt{x^2-1}dx.$$

Q5. Let

$$F(x) = \int_1^{2x} f(t)dt,$$

where

$$f(t) = \int_0^t \frac{\sqrt{1+u^2}}{u}du.$$

Determine $F''(1)$.

Q6. Given

$$\sinh x = \frac{e^x - e^{-x}}{2}, \quad \cosh x = \frac{e^x + e^{-x}}{2},$$

(a) Show that $\cosh x + \sinh x = e^x$.

(b) Show that $(\cosh x + \sinh x)^n = \cosh nx + \sinh nx$.

Q7. Determine the three roots of the complex number

$$z = \sqrt{2} - i\sqrt{6}$$

in cartesian form.