Math 1001 Section 1 (Margo) Assignment #9 Due Nov 14 (Fri) 6pm

Note: the lab for this assignment in on Thursday Nov 13 instead of Tue.

1. Integrate using a trigonometric substitution.

   (a) $\displaystyle\int \frac{\sqrt{x^2-a^2}}{x^4}\,dx$ (b) $\displaystyle\int \frac{1}{x\sqrt{4x^2+9}}\,dx$ (c) $\displaystyle\int \frac{x^2}{\sqrt{25-x^2}}\,dx$

   (d) $\displaystyle\int \frac{1}{x^2\sqrt{9+16x^2}}\,dx$ (e) $\displaystyle\int_0^2 x^3\sqrt{4-x^2}\,dx$ (f) $\displaystyle\int_0^{3\sqrt{3}} \frac{x^3}{\sqrt{x^2+9}}\,dx$

   (g) $\displaystyle\int \frac{x^2}{\sqrt{4x-x^2}}\,dx$ (h) $\displaystyle\int \frac{x}{\sqrt{x^2-6x+5}}\,dx$ (i) $\displaystyle\int \frac{1}{(25-4x^2)^{\frac{3}{2}}}\,dx$

   (j) $\displaystyle\int \frac{1}{x^4+10x^2+25}\,dx$

2. Evaluate $\displaystyle\int \frac{x^3}{\sqrt{x^2-4}}\,dx$ by two methods and compare the answers:

   (a) by trigonometric substitution $x = 2\sec u$

   (b) by substitution $u = x^2 - 4$.

3. Evaluate $\displaystyle\int \sqrt{e^{2t}-9}\,dt$.

4. Let a, b be two positive numbers. Equation

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

   describes an ellipse centered at the origin. Show using integration that the area enclosed by the ellipse given by this equation is πab.