Math 1710 Tutorial 9

More on integration by parts and trigonometric integrals.

Trigonometric substitutions and completing squares.

1. Use integration by parts to evaluate the following integrals:

(a) $\int x^2 e^{3x}\,dx$

(b) $\int \ln(x^2+4)\,dx$

2. Evaluate the following trigonometric integrals:

(a) $\int \frac{\tan^3 x\,\sec^2 x}{\sin^2 x}\,dx$

(b) $\int \sqrt{\tan x}\,\sec^4 x\,dx$

(c) $\int \sin^4 x\,\cos^2 x\,dx$

3. Use trigonometric substitutions to evaluate the following integrals:

(a) $\int \frac{1}{\sqrt{x^2-5}}\,dx$

(b) $\int \frac{x^2}{(2-9x^2)^{3/2}}\,dx$

4. Find the length of the portion of the parabola $y = x^2$ from $(0,0)$ to $(1,1)$.

5. One of the gates in a dam is circular with radius 1 meter. If the gate is closed and the surface of the water is 3 meters above the top of the gate, find the force due to water pressure on the gate.

6. Evaluate the following integrals:

(a) $\int \frac{\sqrt{x^2+2x-3}}{x+1}\,dx$

(b) $\int \sqrt{-y^2+6y}\,dy$

(c) $\int \frac{2x-3}{x^2+6x+13}\,dx$