

MATH181 Homework Sheet 6

Due 14th November 2011

1. Consider the integral

$$I_n = \int_0^{\frac{\pi}{2}} \cos^n(x) dx .$$

- a. Show that

$$I_n = \frac{n-1}{n} I_{n-2}$$

- b. Evaluate I_{10} .

2. Use the substitution $u = \cos x$ to find

$$\int_0^{\frac{\pi}{2}} \sin^5 x dx .$$

3. Find

$$\int \frac{x^4}{x^5 + 3} dx .$$

4. Find

$$\int \frac{x^3 + 2x^2 + x + 1}{x^2 + 2} dx .$$

5. Find

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

6. Calculate the area of a sphere of radius a using the surface integral formula.