Mathematics 170

Worksheet No. 5

Wed. Feb. 1 – Tues Feb. 7

1. Evaluate the following indefinite integrals:

(a) $\int x^3\sqrt{x^4+1}\,dx$

(b) $\int \frac{\cos(x)}{\sin^5(x)}\,dx$

(c) $\int \frac{\ln(\ln(3x+2))}{(3x+2)\ln(3x+2)}\,dx$

(d) $\int e^{-\tan(5x)}\sec^2(5x)\,dx$

2. Evaluate the following definite integrals:

(a) $\int_0^1 \frac{x}{\sqrt{3x^2+1}}\,dx$

(b) $\displaystyle\int_{(\ln 2)^2}^{(\ln 3)^2} \frac{e^{\sqrt{x}}}{\sqrt{2x}}\,dx$

(c) $\displaystyle\int_0^{\frac{\pi}{4}} \frac{\cos(2x)}{2+\sin(2x)}\,dx$

3. Let k be a positive constant. Suppose that the area of the region bounded by $y = \dfrac{1}{\sqrt{kx+1}}$, $x=0$, $x=2$ and the X-axis is 1. What is the value of k?

4. For what non-negative values of "a" is it true that

$$2\int_0^a \frac{x^2}{x^3+1}\,dx = \int_0^{2a} \frac{x^2}{x^3+1}\,dx \quad ?$$

Some Answers (not guaranteed for accuracy!)

2. (a) $\frac{1}{3}$ (b) $\sqrt{2}$ (c) $\ln(\sqrt{1.6})$

3. $k=4$ 4. $a=\sqrt[3]{6}$ and $a=0$.