

## Math 1A Worksheet 32

December 2nd, 2007

- Evaluate the following indefinite integrals:
  - $\int x^3(1 - x^4)^5 dx$
  - $\int \frac{dx}{5-3x}$
  - $\int \frac{1+4x}{\sqrt{1+x+2x^2}} dx$
  - $\int \frac{(\ln x)^2}{x} dx$
  - $\int e^x \sin(e^x) dx$
  - $\int \frac{e^x}{e^x+1} dx$
  - $\int \frac{\sin x}{1+\cos^2 x} dx$
  - $\int x^5 \sqrt[3]{x^3 + 1} dx.$
- Find  $\int_{-2}^2 (x + 3)\sqrt{4 - x^2} dx.$
- Consider the region bounded by the curves  $x + y^2 = 2$  and  $x + y = 0.$ 
  - Sketch this region, making sure to label the points of intersection.
  - Think of  $y$  as a function of  $x$ , and sketch four (tall and narrow) approximating rectangles.
  - Still thinking of  $y$  as a function of  $x$ , express the area of this region as a sum of two definite integrals.
  - Now, thinking of  $x$  as a function of  $y$ , sketch four (short and wide) approximating rectangles.
  - Continuing to think of  $x$  as a function of  $y$ , express the area of this region as a single definite integral.
  - Evaluate the integrals in c) and e). Did you get the same answer? (You should!)
- Find a number  $a$  such that the line  $x = a$  bisects the area under the curve  $y = 1/x^2$ ,  $1 \leq x \leq 4.$
  - Find a number  $b$  such that the line  $y = b$  also bisects the same area.

5. If  $a$  and  $b$  are positive real numbers, show that

$$\int_0^1 x^a(1-x)^b dx = \int_0^1 x^b(1-x)^a dx.$$