Math 1312
Prof. Khamsi,
Review of Calculus I

Problem 1. Suppose that

$$\int_0^1 f(x)dx = \frac{1}{2};\ \int_1^2 f(x)dx = \frac{1}{4};\ \int_0^3 f(x)dx = -1;\ \int_0^1 g(x)dx = 2.$$

In each part, use this information to evaluate the given integral, if possible. If there is not enough information to evaluate the integral, then say no.

$$(a)\ \int_0^2 f(x)dx;\ (b)\ \int_1^3 f(x)dx;\ (c)\ \int_2^3 5f(x)dx;\ (d)\ \int_1^0 g(x)dx;$$

$$(e)\ \int_0^1 f(2x)dx;\ (f)\ \int_0^1 g(2x)dx;\ (g)\ \int_0^1 [g(x)]^2dx;\ (h)\ \int_0^1 f(x)g(x)dx;$$

$$(i)\ \int_0^1 \Big(f(x)+g(x)\Big)dx;\ (j)\ \int_0^1 \frac{f(x)}{g(x)}dx;\ (k)\ \int_0^1 \Big(4f(x)-3g(x)\Big)dx$$

Problem 2. In each part, evaluate the integral. Where appropriate, you may use a geometric formula

$$(a)\ \int_{-1}^1 \Big(1+\sqrt{1-x^2}\Big)dx;\ (b)\ \int_0^3 \Big(x\sqrt{1+x^2}-\sqrt{9-x^2}\Big)dx$$

Problem 3. Evaluate the following integral and sketch the region whose area it represents

$$\int_0^1 |2x-1|dx$$

Problem 4. Explain without computing the integrals why

$$\int_1^e \ln(x)dx + \int_0^1 e^x dx = e$$