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1. Set an integral for each of the volumes of the solids obtained by rotating the region enclosed by the graphs of  $f(x) = x^2$  and  $g(x) = 2 - x^2$  about the following axes:

- (a) The  $x$  axis.            (b) The line  $y = -1$ .            (c) The line  $x = 2$ .

2. Let  $S$  be the area between the lines  $y = 2x$ ,  $x = 5$  and above the  $x$ -axis. Set an integral for the volume that its base is the area  $S$  and its cross sections that perpendicular to the  $y$ -axis are squares.

3. Evaluate each of the following indefinite integrals.

(a)  $\int x^6 \ln x dx$             (b)  $\int \frac{dx}{x^3 \sqrt{x^2 - 4}}$             (c)  $\int \frac{x}{x^2(x-1)} dx$

(d)  $\int \tan^3 x \sec^4 x dx$  in two ways.

4. Evaluate each of the following definite integrals.

(a)  $\int_0^{\pi/4} \sin^3 x \sqrt{x} dx$             (b)  $\int_0^{\pi} x \sin x dx$             (c)  $\int_0^1 e^{x+e^x} dx$

5. (a) Find  $A$ , the average value of the function  $f(x) = e^{\sqrt{x}}$  on the interval  $[0, 4]$ .

(b) For what value of  $x$  the function gets its average  $A$ ?

6. Let  $I = \int_0^1 e^{-\frac{x^2}{2}} dx$

(a) Find the error bound when approximating  $I$  using the Trapezoidal Method with  $N = 100$ .

(b) Find the value of  $N$  for which the error when approximating  $I$  using the Trapezoidal Method is less than  $10^{-6}$