

1. What is  $\int_0^{1/4} \frac{\tan(\pi x)}{[\ln(\cos(\pi x)) + 1]^5} dx$ ?

2. Approximate  $\int_1^5 \sqrt{x+1} dx$  using a righthand Riemann sum and  $n = 4$  rectangles. Is this an over or underestimate?

3. Let  $A$  be the area of the region between the curves  $y = \frac{1}{\sqrt{2}}$ ,  $y = x^{1/4}$  and  $y = x^2$ .

(a) Find  $A$  by integrating with respect to  $x$ . *Hint: Draw a graph - you will need two integrals.*

(b) Find  $A$  by integrating with respect to  $y$ . *Hint: You only need one integral this time.*

4. For  $x > 0$  find the value of  $x$  which minimizes the function  $f(x) = \int_{2x}^{3x} \ln t dt$ .

5. Let  $B$  be the region between the curve  $y = \sqrt{x-1}$ , the  $x$ -axis and the vertical line  $x = 5$ .

(a) Set up an integral expressing the volume obtained from rotating  $B$  about the  $x$ -axis.

(b) Set up the integral with respect to  $y$  for the volume of the solid obtained by rotating  $B$  about the  $y$ -axis.

(c) Set up the integral with respect to  $x$  for the volume of the solid obtained by rotating  $B$  about the  $y$ -axis.

6. Compute the following integrals:

(a) 
$$\int_0^{2\pi} |\sin t - \cos t| dt$$

(b) 
$$\int \frac{1}{(1 + \sqrt{x})^3} dx$$