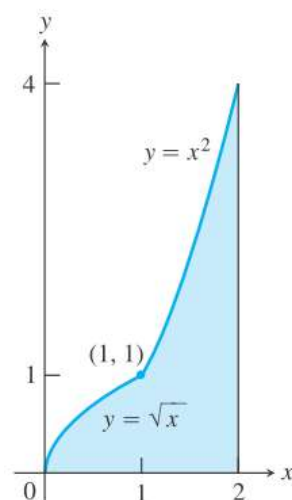


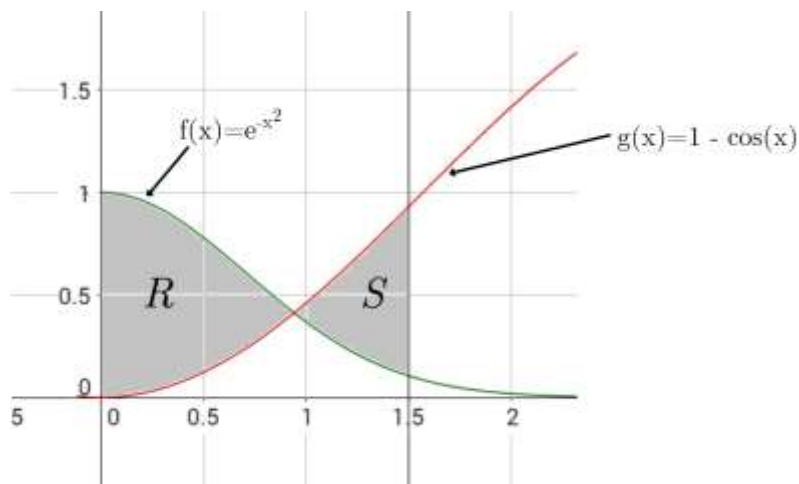
I-A4a NO CALC

1. Find the exact area of the shaded region. Show all work.



I-A4b CALC OK

2. Let  $f(x) = e^{-x^2}$  and  $g(x) = 1 - \cos(x)$ . The regions R and S are bounded by  $f(x)$ ,  $g(x)$ , the y-axis, and the vertical line  $x = 1.5$ . Find the total shaded area. Show the setup of your integrals and all related calculations.



I-U4: NO CALC

Let  $f(x) = \int_3^{2x} 2t^2 - 3t - 2 dt$ .

3. Find  $f'(x)$ . Simplify your answer.

4. Find all intervals where  $f(x)$  is increasing. Justify your answer.

## I-U7 NO CALC

Suppose  $f(x)$  and  $h(x)$  are continuous functions such that

$$\int_1^9 f(x) dx = -1, \quad \int_7^9 f(x) dx = 5, \quad \int_7^9 h(x) dx = 4.$$

5.  $\int_9^7 [h(x) - f(x)] dx$

6.  $\int_1^7 f(x) dx$

## I-U5 NO CALC

7.  $\int_4^9 2x - \frac{1}{\sqrt{x}} dx$

8. If  $\int_{-2}^2 (x^3 + k) dx = 16$ , then what is the value of  $k$ ?

## I-A3 NO CALC

9. Suppose  $f'(x) = 2\sqrt{x}$  and  $f(1) = 4$ . Find the value of  $f(4)$ .

## I-U3b CALC OK

10. Find the midpoint rectangle approximation for  $\int_3^7 \tan(0.2x) dx$  using 4 rectangles of equal width. [3 decimal places of accuracy.]

## I-U3c NO CALC

11. An awesome rocket ship is in the air and doing cool rocket things. Its velocity  $v(t)$  is a differentiable, strictly increasing function. Selected values are given below. Using correct units, explain the meaning of  $\int_2^{10} v(t) dt$  in the context of this problem. Then, approximate the value of  $\int_2^{10} v(t) dt$  using the 4 trapezoids indicated by the table.

$t, \text{ sec}$	2	4	6	8	10
$v(t), \text{ m/s}$	12	18	27	38	52