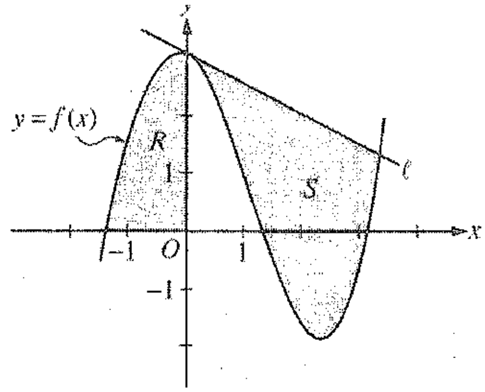
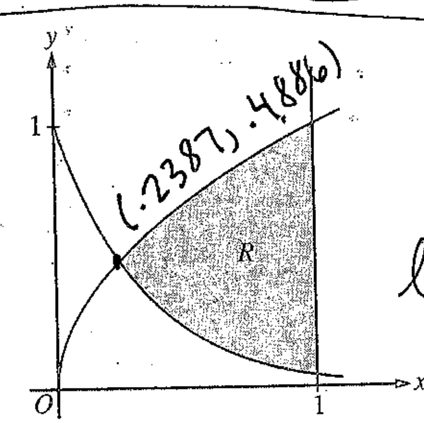


let $A = -1.373$

1. Let f be the function given by $f(x) = \frac{x^3}{4} - \frac{x^2}{3} - \frac{x}{2} + 3\cos x$. Let R be the shaded region in the second quadrant bounded by the graph of f, and let S be the shaded region bounded by the graph of f and line ℓ, the line tangent to the graph of f at $x = 0$, as shown above.

   (a) Find the area of R.

$$\int_A^0 f(x)\,dx = \boxed{2.903}$$

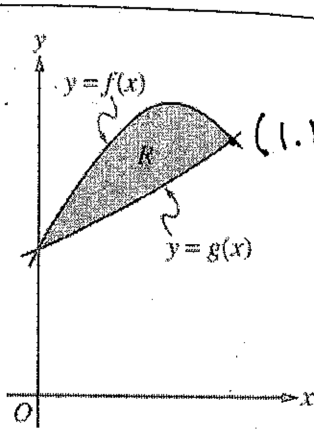


let $C = 0.2387$

1. Let R be the shaded region bounded by the graphs of $y = \sqrt{x}$ and $y = e^{-3x}$ and the vertical line $x = 1$, as shown in the figure above.

   (a) Find the area of R.

$$\int_C^1 \sqrt{x} - e^{-3x}\,dx = \boxed{.4426}$$

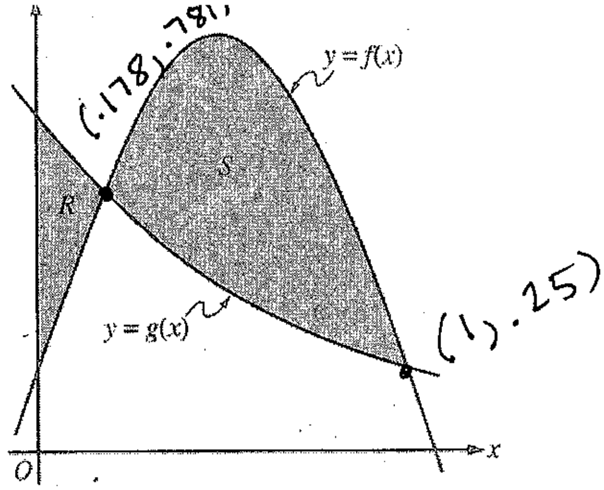


let $D = 1.13569$

1. Let f and g be the functions given by $f(x) = 1 + \sin(2x)$ and $g(x) = e^{x/2}$. Let R be the shaded region in the first quadrant enclosed by the graphs of f and g as shown in the figure above.

   (a) Find the area of R.

$$\int_0^D 1 + \sin(2x) - e^{x/2}\,dx = \boxed{.429}$$



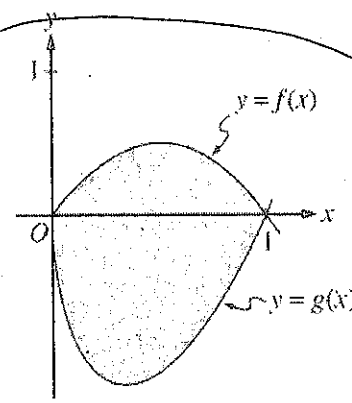
1. Let f and g be the functions given by $f(x) = \frac{1}{4} + \sin(\pi x)$ and $g(x) = 4^{-x}$. Let R be the shaded region in the first quadrant enclosed by the y-axis and the graphs of f and g, and let S be the shaded region in the first quadrant enclosed by the graphs of f and g, as shown in the figure above.

   (a) Find the area of R. let $A = .178218$

   (b) Find the area of S.

a. $$\int_0^A 4^{-x} - \left(\tfrac{1}{4} + \sin \pi x\right)\, dx = \boxed{.064}$$

b. $$\int_A^1 \tfrac{1}{4} + \sin \pi x - 4^{-x}\, dx = \boxed{.4103}$$

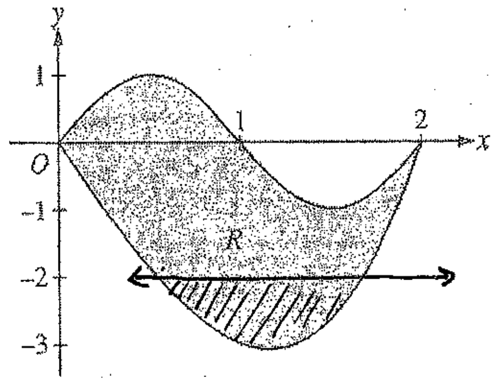


2. Let f and g be the functions given by $f(x) = 2x(1-x)$ and $g(x) = 3(x-1)\sqrt{x}$ for $0 \le x \le 1$. The graphs of f and g are shown in the figure above.

   (a) Find the area of the shaded region enclosed by the graphs of f and g.

$$\int_0^1 f(x) - g(x)\, dx = \boxed{1.133}$$

A graphing calculator is required for some problems or parts of problems.



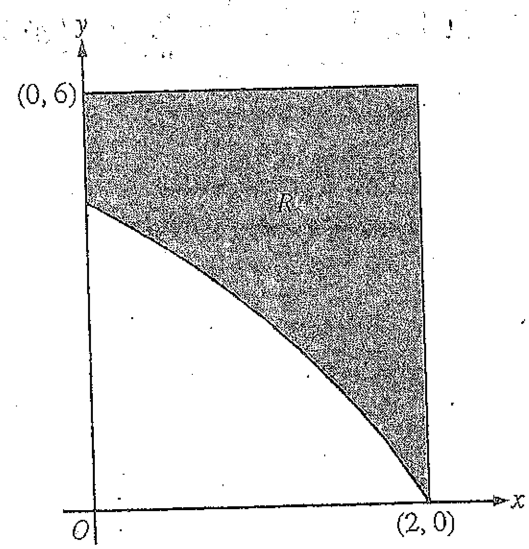
Let R be the region bounded by the graphs of $y = \sin(\pi x)$ and $y = x^3 - 4x$, as shown in the figure above.

(a) Find the area of R.

(b) The horizontal line $y = -2$ splits the region R into two parts. Write, but do not evaluate, an integral expression for the area of the part of R that is below this horizontal line.

a. $\int_0^2 [\sin \pi x - (x^3 - 4x)]\, dx = 4$

b. $\int_{.539}^{1.675} -2 - (x^3 - 4x)\ dx$

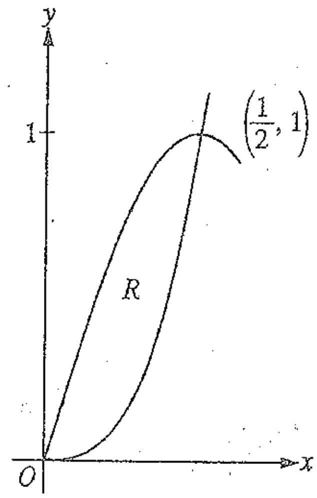


In the figure above, R is the shaded region in the first quadrant bounded by the graph of $y = 4\ln(3 - x)$, the horizontal line $y = 6$, and the vertical line $x = 2$.

(a) Find the area of R. $\int_0^2 6 - 4\ln(3 - x)\ dx$ OR $12 - \int_0^2 4\ln(3-x)\, dx$

$= 6.816$

No calculator.



Let R be the region in the first quadrant enclosed by the graphs of $f(x) = 8x^3$ and $g(x) = \sin(\pi x)$, as shown in the figure above.

(a) Write an equation for the line tangent to the graph of f at $x = \frac{1}{2}$.

(b) Find the area of R.

a. pt $\boxed{\left(\tfrac{1}{2}, 1\right)}$

slope: $y' = 24x^2$

$y'\left(\tfrac{1}{2}\right) = 24\left(\tfrac{1}{2}\right)^2 = \boxed{6}$

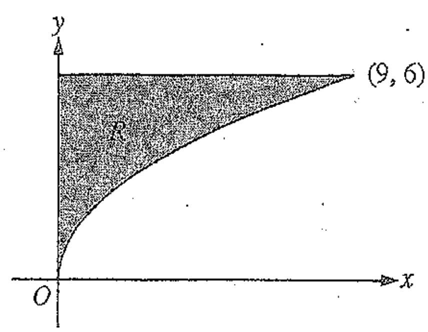
$y - 1 = 6\left(x - \tfrac{1}{2}\right)$

b.

$$\int_0^{1/2} \sin(\pi x) - 8x^3 \, dx$$

$$= -\frac{1}{\pi}\cos \pi x - \frac{8x^4}{4} \Big]_0^{1/2}$$

$$= \left[-\frac{1}{\pi}\cos\left(\pi \cdot \tfrac{1}{2}\right) - 2\left(\tfrac{1}{2}\right)^4\right] - \left[-\frac{1}{\pi}\cos(\pi \cdot 0) - 2(0)^4\right]$$



Let R be the region in the first quadrant bounded by the graph of $y = 2\sqrt{x}$, the horizontal line $y = 6$, and the y-axis, as shown in the figure above.

(a) Find the area of R.

$$\int_0^9 (6 - 2\sqrt{x}) \, dx$$

OR $54 - \int_0^9 2\sqrt{x} \, dx$

$$= 6x - \frac{2x^{3/2}}{3/2} \Big]_0^9$$

$$= 6x - \frac{4}{3}(x)^{3/2} \Big]_0^9 = 18$$