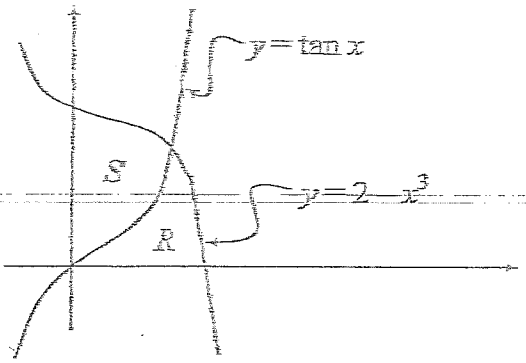


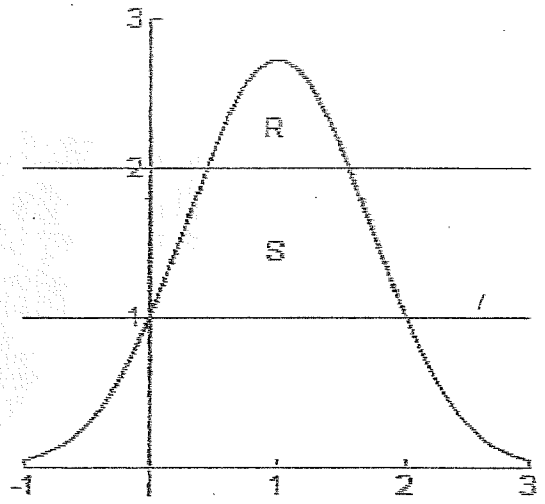
1) 2001 #1

Let R and S be the regions in the first quadrant shown in the figure above. The region R is bounded by the x-axis and the graphs of $y = 2 - x^3$ and $y = \tan x$. The region S is bounded by the y-axis and the graphs of $y = 2 - x^3$ and $y = \tan x$.

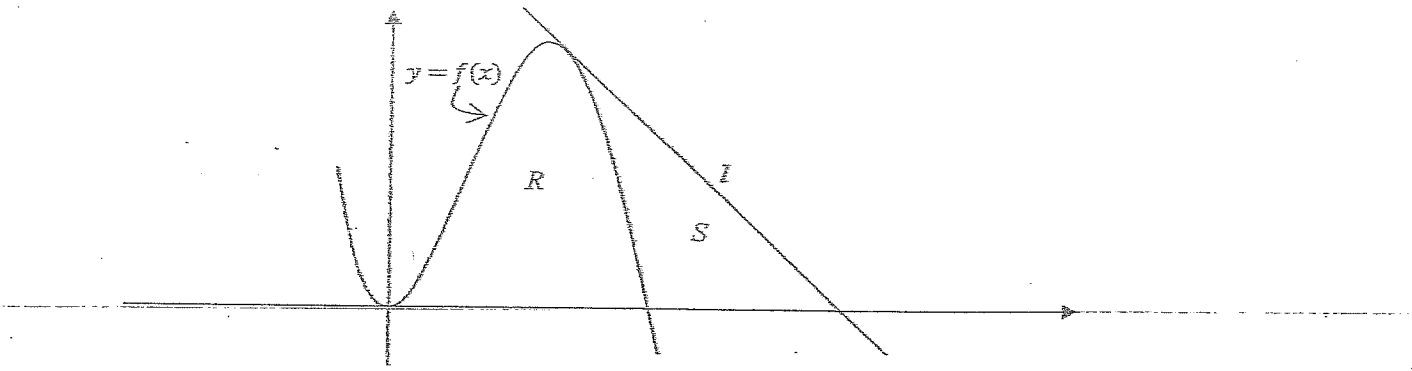
a) Find the area of R
b) Find the area of S

2) 2007Form B #1

Let R be the region bounded by the graph of $y = e^{(2x-x^2)}$ and the horizontal line $y = 2$, and let S be the region bounded by the graph of $y = e^{(2x-x^2)}$ and the horizontal lines $y = 1$ and $y = 2$, as shown to the right.



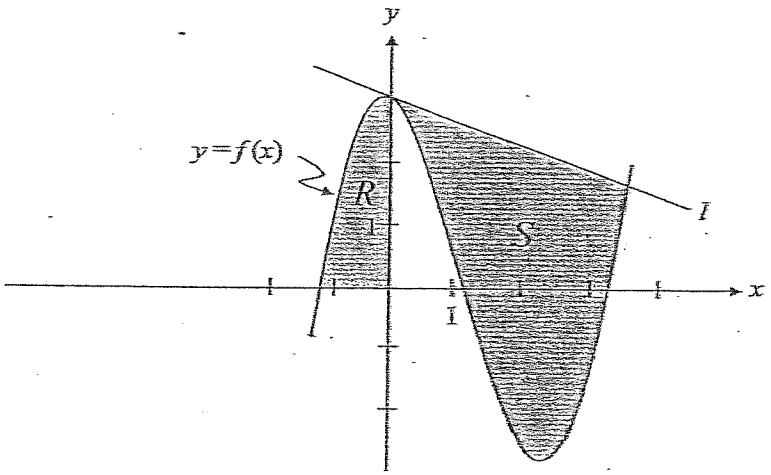
a) Find the area of R
b) Find the area of S



3) 2003 Form B #1

Let R be the region bounded by the graph of $f(x) = 4x^2 - x^3$ and the x-axis. Let l be the line tangent to f at $x = 3$ and let S be the region bounded by the graph of f, the line l, and the x-axis as shown in the figure above.

a) Find the equation of line l written in slope-intercept form.
b) Find the area of R.
c) Find the area of S.



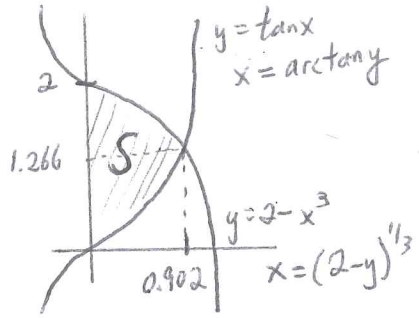
4) 2006 Form B #1

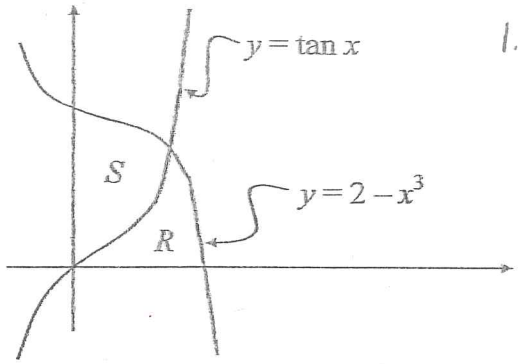
Let f be the function given by $f(x) = \frac{x^3}{4} - \frac{x^2}{3} - \frac{x}{2} + 3\cos x$. Let R be the shaded region in the second quadrant bounded by the graph of f, and let S be the shaded region bounded by the graph of f and line l, the line tangent to f at $x = 0$, as shown above.

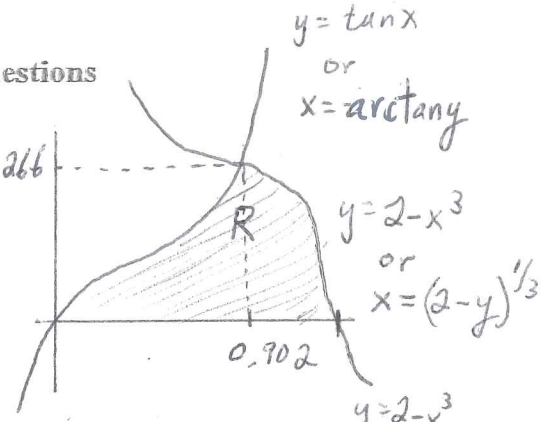
a) Find the area of R.
b) Find the area of S.

KEY

AP CALCULUS AB **Tougher Area/Volume Practice Questions**







$y = 2-x^3$

$2-x^3 = 0$

$x = \sqrt[3]{2}$

1) 2001 #1

Let R and S be the regions in the first quadrant shown in the figure above. The region R is bounded by the x-axis and the graphs of $y = 2 - x^3$ and $y = \tan x$. The region S is bounded by the y-axis and the graphs of $y = 2 - x^3$ and $y = \tan x$.

a) Find the area of R
b) Find the area of S

Top/Bottom

a₁) $\int_0^{0.902} \tan x\,dx + \int_{0.902}^{\sqrt[3]{2}} 2-x^3\,dx$

OR

Right/Left

a₂) $\int_0^{1.266} (2-y)^{1/3} - \arctan y\,dy$

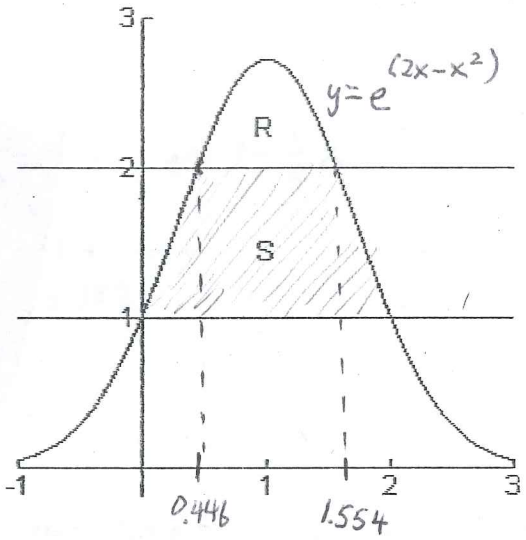
b₁) Top/Bottom $\int_0^{0.902} 2-x^3-(\tan x)\,dx$

OR

b₂) Right/Left $\int_0^{1.266} \arctan y - 0\,dy + \int_{1.266}^{2} (2-y)^{1/3} - 0\,dy$

2) 2007 Form B #1

Let R be the region bounded by the graph of $y = e^{(2x-x^2)}$ and the horizontal line $y = 2$, and let S be the region bounded by the graph of $y = e^{(2x-x^2)}$ and the horizontal lines $y = 1$ and $y = 2$, as shown to the right.



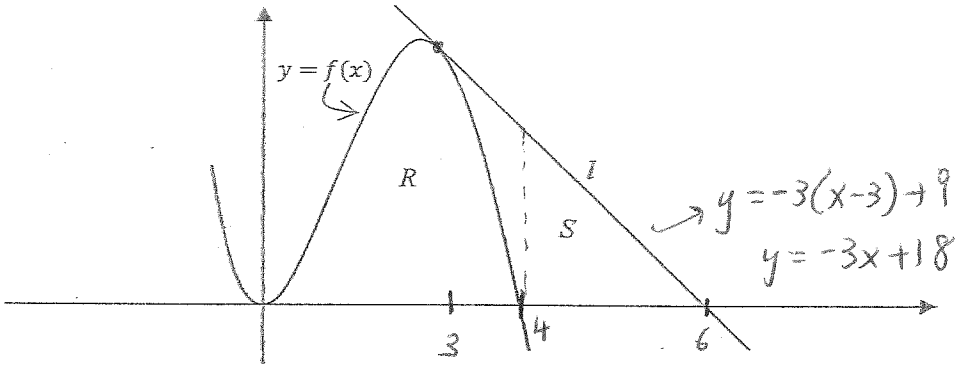
a) Find the area of R
b) Find the area of S

a) $A = \int_{0.466}^{1.554} e^{2x-x^2} - 2\,dx$

b) $\int_0^{0.446} e^{2x-x^2} - 1\,dx + \int_{0.446}^{1.554} 2-1\,dx + \int_{1.554}^{2} e^{2x-x^2} - 1\,dx$

OR

$\int_0^{2} e^{2x-x^2} - 1\,dx - \int_{0.466}^{1.554} e^{2x-x^2} - 2\,dx$



$y = -3(x-3)+9$

$y = -3x+18$

3) 2003 Form B #1

$f'(x) = 8x - 3x^2$

Let R be the region bounded by the graph of $f(x) = 4x^2 - x^3$ and the x-axis. Let l be the line tangent to f at $x = 3$ and let S be the region bounded by the graph of f, the line l, and the x-axis as shown in the figure above.

a) Find the equation of line l written in slope-intercept form.
b) Find the area of R.
c) Find the area of S.

a) $f'(3) = 24 - 27 = -3$

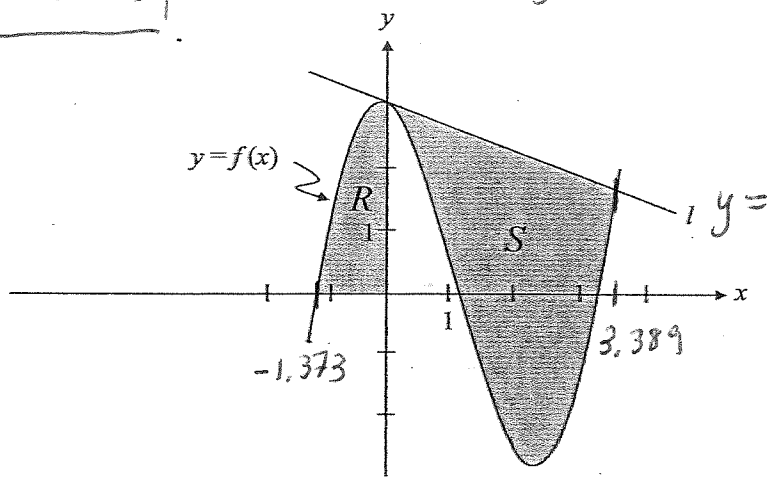
$f(3) = 9$

point: $(3, 9)$ $m = -3$

$\boxed{y - 9 = -3(x-3)}$

b) $\text{Area}_{(R)} = \int_0^4 4x^2 - x^3\,dx = \boxed{\frac{64}{3}}$

c) $\text{Area}_{(S)} = \int_3^4 -3x+18-(4x^2-x^3)\,dx + \int_4^6 -3x+18\,dx = \boxed{7.917}$



$y = 3 - \frac{1}{2}x$

4) 2006 Form B #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 f at $x = 0$, as shown above.

a) Find the area of R.
b) Find the area of S.

a) $A = \int_{-1.373}^{0} f(x)\,dx$

b) $A = \int_0^{3.389} \left(3 - \frac{1}{2}x\right) - f(x)\,dx$