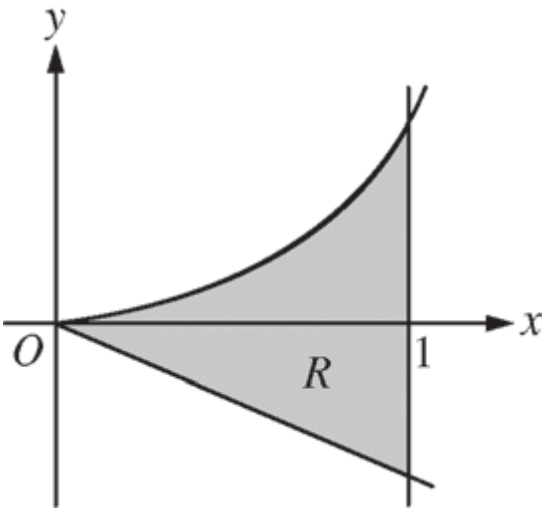
Arc Length

2014 BC5



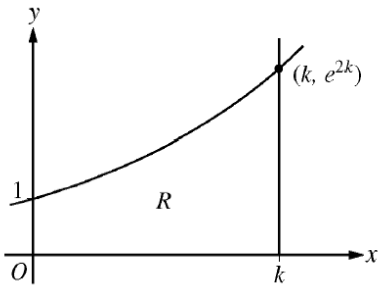
5. Let R be the shaded region bounded by the graph of $y = xe^{x^2}$, the line y = -2x, and the vertical line x =1, as shown in the figure above.

c) Write, but do not evaluate, an expression involving one or more integrals that gives the perimeter of R.

2011 BC 3

Let $f(x) = e^{2x}$. Let R be the region in the first quadrant bounded by the graph of f, the coordinate axes and the vertical line x = k, where k > 0. The region R is shown in the figure.

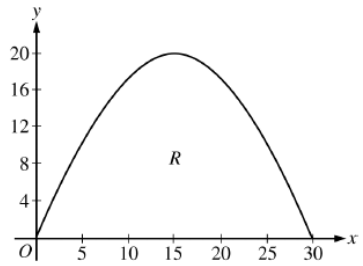
a. Write, but do not evaluate, an expression involving an integral that gives the perimeter of R in terms of k.



2009 Form B BC1

A baker is creating a birthday cake. The base of the cake is the region R in the first quadrant under the graph of y = f(x) for $0 \le x \le 30$, where $f(x) = 20\sin\left(\frac{\pi x}{30}\right)$. Both x and y are measured in centimeters. The region R is shown in the figure above. The derivative of f is $f'(x) = \frac{2\pi}{3}\cos\left(\frac{\pi x}{30}\right)$.

c. Find the perimeter of the base of the cake.



15. The length of a curve from x = 1 to x = 4 is given by $\int_1^4 \sqrt{1+9x^4}\,dx$. If the curve contains the point (1, 6), which of the following could be an equation for this curve?

A) $y = 3 + 3x^2$
B) $y = 5 + x^3$
C) $y = 6 + x^3$
D) $y = 6 - x^3$
E) $y = \frac{16}{5} + x + \frac{9}{5}x^5$

No Calculator

4. Which of the following integrals gives the length of the curve y = ln x from x = 1 to x = 2?

A) $\int_1^2 \sqrt{1+\frac{1}{x^2}}\,dx$

B) $\int_1^2 \left(1+\frac{1}{x^2}\right)dx$

C) $\int_1^2 \sqrt{1+e^{2x}}\,dx$

D) $\int_1^2 \sqrt{1+(\ln x)^2}\,dx$

E) $\int_1^2 \left(1+(\ln x)^2\right)dx$