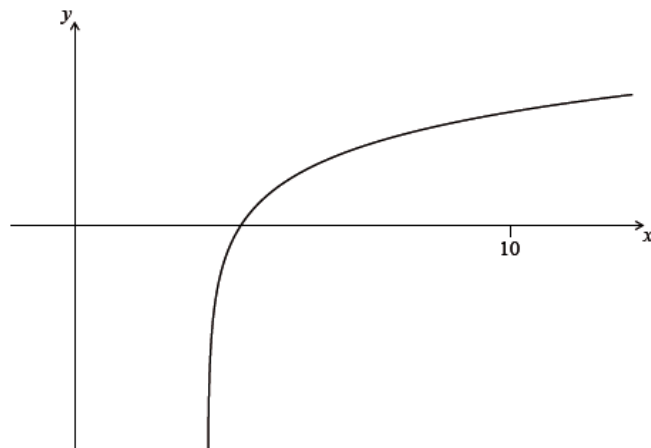


Pretest: Integration of solids from rotation

1a. Let $f(x) = 2 \ln(x - 3)$, for $x > 3$. The following diagram shows part of the graph of f .



Find the equation of the vertical asymptote to the graph of f .

[2 marks]

1b. Find the x -intercept of the graph of f .

[2 marks]

1c. The region enclosed by the graph of f , the x -axis and the line $x = 10$ is rotated 360° about the x -axis. Find the volume of the solid formed.

[3 marks]

2a. Let $f(x) = -x^4 + 2x^3 - 1$, for $0 \leq x \leq 2$.

Sketch the graph of f .

[3 marks]

2b. Solve $f(x) = 0$.

[2 marks]

2c. The region enclosed by the graph of f and the x -axis is rotated 360° about the x -axis.

Find the volume of the solid formed.

[3 marks]

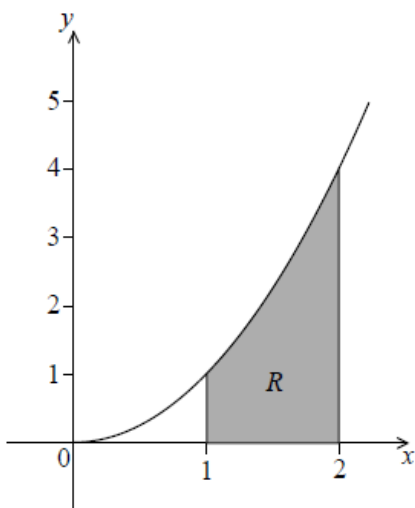
3a. Let $f(x) = x^2$.

[no calculator on this problem]

Find $\int_1^2 (f(x))^2 dx$.

[4 marks]

3b. The following diagram shows part of the graph of f .

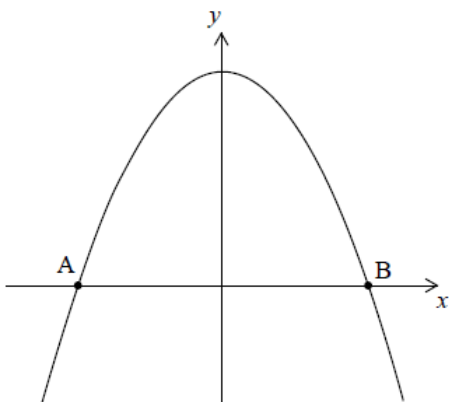


The shaded region R is enclosed by the graph of f , the x -axis and the lines $x = 1$ and $x = 2$.

Find the volume of the solid formed when R is revolved 360° about the x -axis.

[2 marks]

4a. Let $f(x) = 5 - x^2$. Part of the graph of f is shown in the following diagram.



The graph crosses the x -axis at the points A and B .

Find the x -coordinate of A and of B .

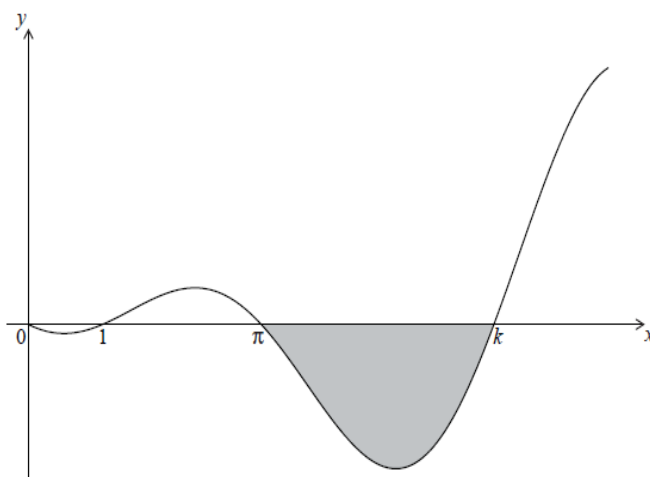
[3 marks]

4b. The region enclosed by the graph of f and the x -axis is revolved 360° about the x -axis.

Find the volume of the solid formed.

[3 marks]

5a. The graph of $y = (x - 1) \sin x$, for $0 \leq x \leq \frac{5\pi}{2}$, is shown below.



The graph has x -intercepts at $0, 1, \pi$ and k .

Find k .

[2 marks]

5b. The shaded region is rotated 360° about the x -axis. Let V be the volume of the solid formed.

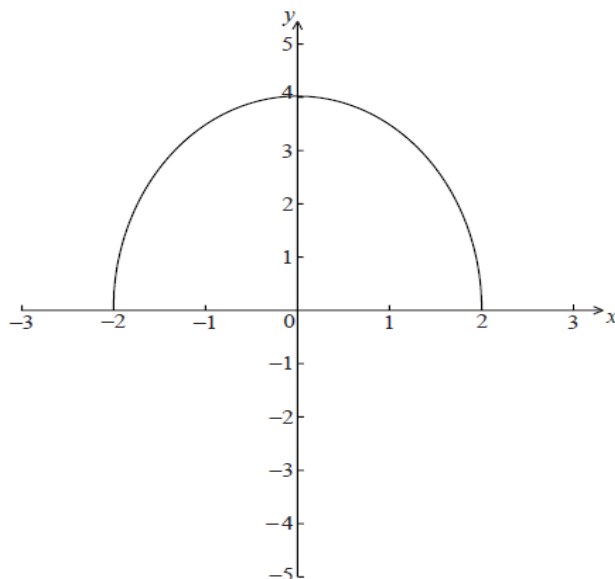
Write down an expression for V .

[3 marks]

5c. Find V .

[2 marks]

6. The graph of $f(x) = \sqrt{16 - 4x^2}$, for $-2 \leq x \leq 2$, is shown below. [no calculator on this problem]



The region enclosed by the curve of f and the x -axis is rotated 360° about the x -axis.

Find the volume of the solid formed.

[6 marks]

7a. Let $f(x) = \sqrt{x}$. Line L is the normal to the graph of f at the point $(4, 2)$.

[no calculator]

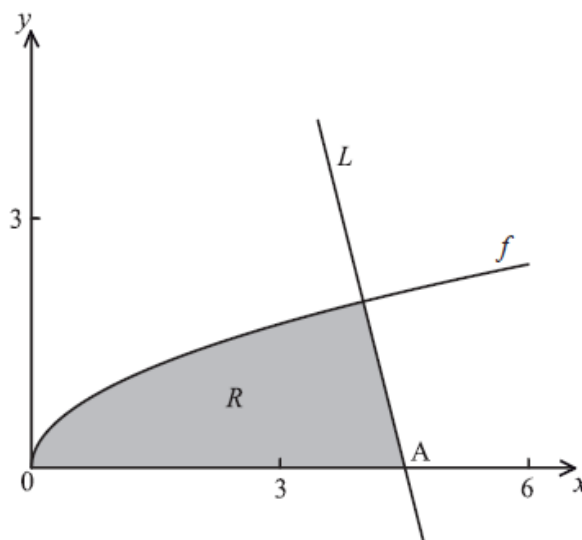
Show that the equation of L is $y = -4x + 18$.

[4 marks]

7b. Point A is the x -intercept of L . Find the x -coordinate of A .

[2 marks]

7c. In the diagram below, the shaded region R is bounded by the x -axis, the graph of f and the line L .



Find an expression for the area of R .

[3 marks]

7d. The region R is rotated 360° about the x -axis. Find the volume of the solid formed, giving your answer in terms of π .

[8 marks]

8a. Let $f(x) = x^2$ and $g(x) = 3 \ln(x + 1)$, for $x > -1$.

Solve $f(x) = g(x)$.

[3 marks]

8b. Find the area of the region enclosed by the graphs of f and g .

[3 marks]