

Unit 5 Exam Part 1: Integral Calculus - with calculator

You may use a calculator on these problems

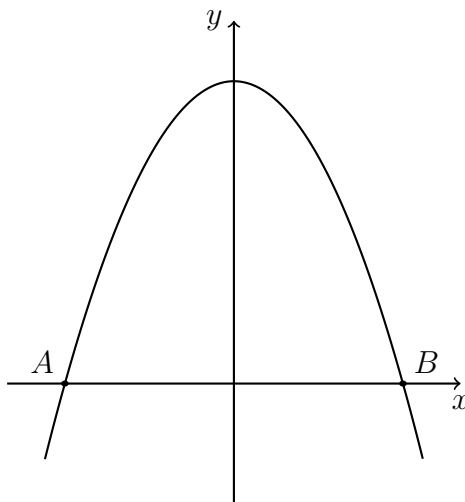
[34 marks]

1. Let $f(x) = x^2$ and $g(x) = \sin(x + 1)$.

(a) Solve for $f(x) = g(x)$. [3]

(b) Find the area of the region enclosed by the graphs of f and g . [3]

2. Let $f(x) = 6 - x^2$. Part of the graph of f is shown in the following diagram.



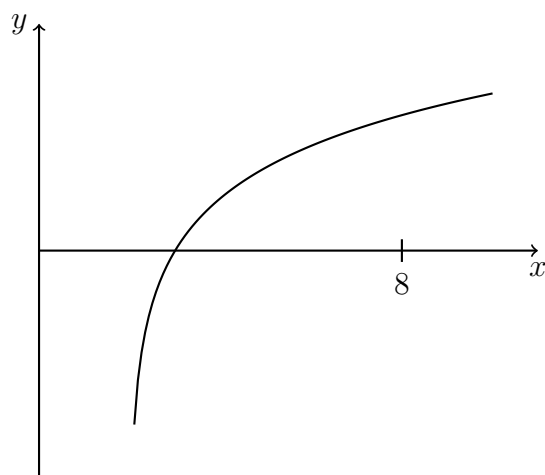
(a) The graph crosses the x -axis at the points A and B .

Find the x -coordinate of A and of B . [3]

(b) 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]

Name:

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



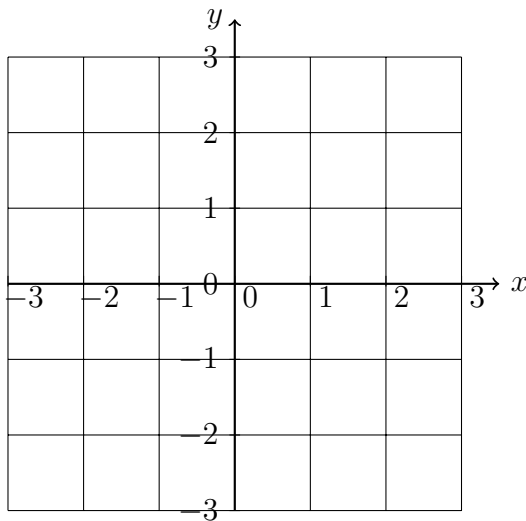
- (a) Find the equation of the vertical asymptote to the graph of f . [2]
- (b) Find the x -intercept of the graph of f . [2]
- (c) The region enclosed by the graph of f , the x -axis, and the line $x = 8$ is rotated 360° about the x -axis. Find the volume of the solid formed. [3]

Name:

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

(a) Sketch the graph of f .

[3]



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

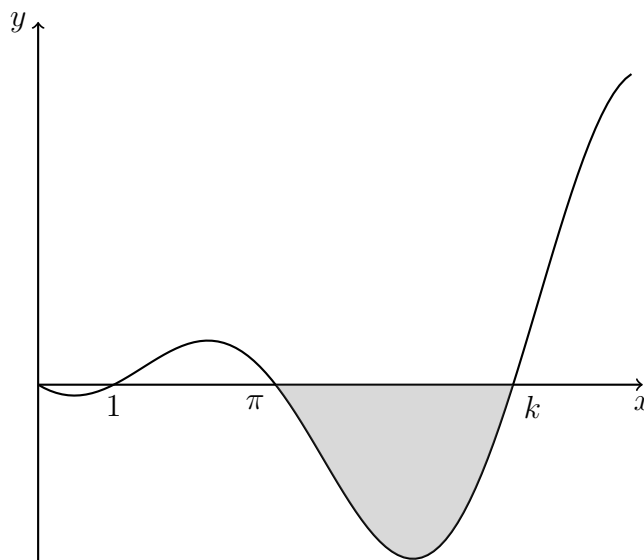
[2]

(c) 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]

Name:

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



- (a) The graph has x -intercepts at $0, 1, \pi$, and k . Find k . [2]
- (b) 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]
- (c) Find V . [2]

Unit 5 Exam Part 2: Integral Calculus - without calculator

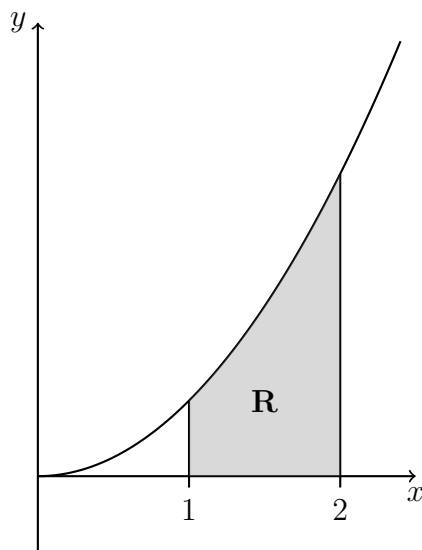
No Calculator section

[38 marks]

6. Let $f(x) = x^2$.

(a) Find $\int_1^2 (f(x))^2 dx$ [4]

(b) 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]