

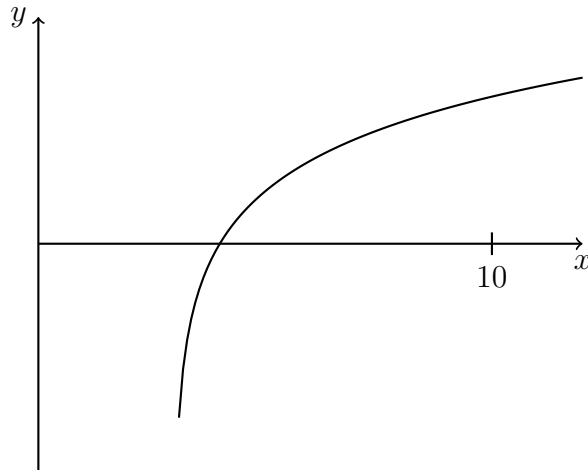
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Unit 5 Exam Part 1: Integral Calculus - with calculator

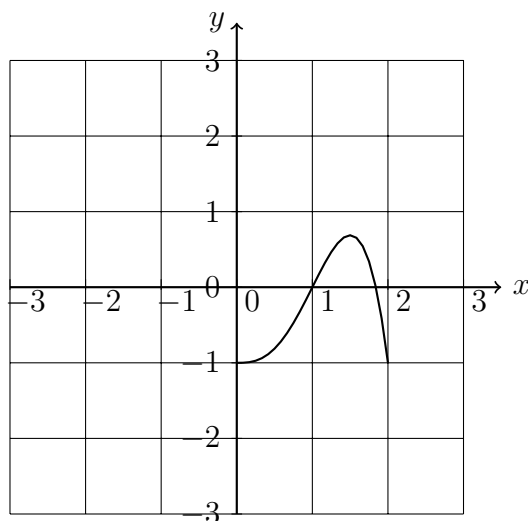
You may use a calculator on these problems

[34 marks]

1. Let $f(x) = 2 \ln(x - 3)$, for $x > 3$. 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 $x = 10$ is rotated 360° about the x -axis. Find the volume of the solid formed. [3]
2. Let $f(x) = -x^4 + 2x^3 - 1$, for $0 \leq x \leq 2$.
- (a) Sketch the graph of f . [3]

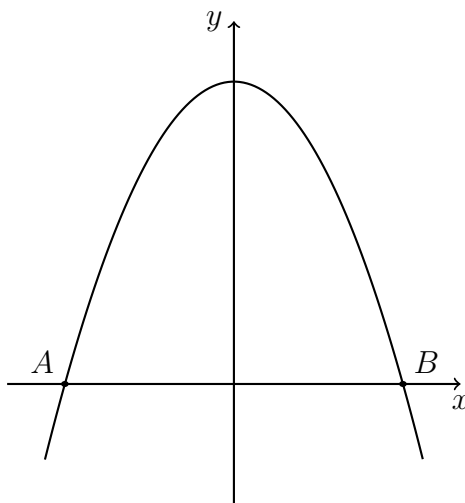


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(b) Solve for $f(x) = 0$. [2]

(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]

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

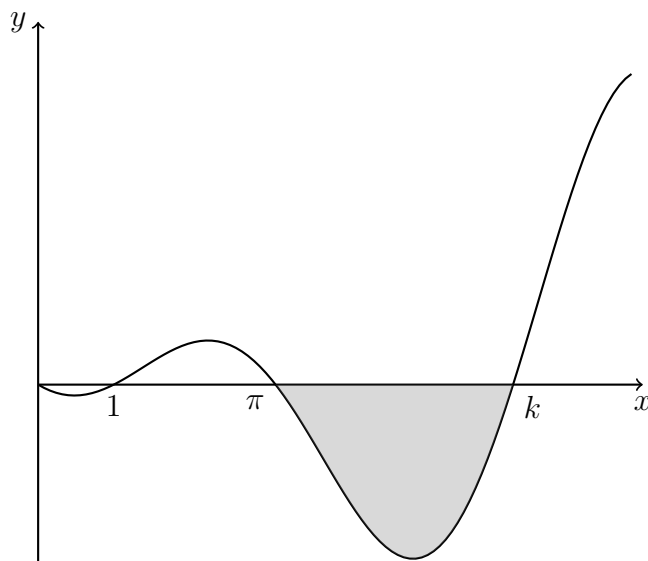


(a) The graph crosses the x -axis at the points A and B .

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]

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



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(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]

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

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

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

Unit 5 Exam Part 2: Integral Calculus - without calculator

No Calculator section

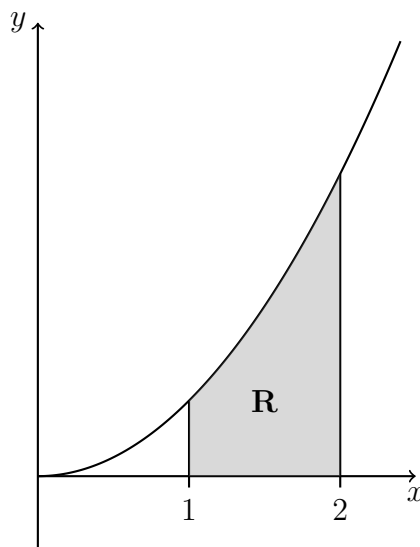
[38 marks]

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]