Questions: Area between two curves

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Summary

A selection of questions for the study guide on the area between two curves.

Before attempting these questions, it is highly recommended that you read [Guide: Area between two curves].

Q1

Calculate the area of the shaded region between the following graphs and the x-axis.

1.1. *Insert figure of the graph of $y = x^3$ with shaded region between $x = 0$ and $x = 2$ bounded by the graph and the x-axis.*

1.2. *Insert figure of the graph of $y = \sqrt{4 - x}$ with shaded region between $x = 0$ and $x = 4$ bounded by the graph and the x-axis.*

1.3. *Insert figure of the graph of $y = \sqrt{2x}$ with shaded region between $x = 0$ and $x = 2$ bounded by the graph and the x-axis.*

1.4. *Insert figure of the graph of $y = 2 - x$ with shaded region between $x = 0$ and $x = 2$ bounded by the graph and the x-axis.*

1.5. *Insert figure of the graph of $y = \dfrac{1}{x}$ with shaded region between $x = 1$ and $x = 2$ bounded by the graph and the x-axis.*

1.6. *Insert figure of the graph of $y = x^2 - 2$ with shaded region between $x = -\sqrt{2}$ and $x = \sqrt{2}$ bounded by the x-axis and the graph.*

1.7. *Insert figure of the graph of $y = 2x - x^2$ with shaded region between $x = 0$ and $x = 2$ bounded by the graph and the x-axis.*

1.8. *Insert figure of the graph of $y = x(x-1)$ with shaded region between $x = 0$ and $x = 1$ bounded by the x-axis and the graph.*

1.9. *Insert figure of the graph of $y = x^3 - x$ with shaded region between $x = 0$ and $x = 1$ bounded by the graph and the x-axis.*

1.10. *Insert figure of the graph of $y = 1 - \dfrac{x^2}{4}$ with shaded region between $x = -2$ and $x = 2$ bounded by the graph and the x-axis.*

Q2

Calculate the area of the shaded region between the following trigonometric graphs and the x-axis.

2.1. *Insert figure of the graph of* $y = \sin(x)$ *with shaded region between* $x = 0$ *and* $x = \pi$ *bounded by the graph and the* x*-axis.*

2.2. *Insert figure of the graph of* $y = \cos(x)$ *with shaded region between* $x = \dfrac{\pi}{2}$ *and* $x = \dfrac{3\pi}{2}$ *bounded by the graph and the* x*-axis.*

2.3. *Insert figure of the graph of* $y = \cos(2x)$ *with shaded region between* $x = 0$ *and* $x = \dfrac{\pi}{2}$ *bounded by the graph and the* x*-axis.*

2.4. *Insert figure of the graph of* $y = \sin(2x)$ *with shaded region between* $x = 0$ *and* $x = \pi$ *bounded by the graph and the* x*-axis.*

2.5. *Insert figure of the graph of* $y = \sin(3x)$ *with shaded region between* $x = 0$ *and* $x = \dfrac{\pi}{3}$ *bounded by the graph and the* x*-axis.*

2.6. *Insert figure of the graph of* $y = \sin(3x)$ *with shaded region between* $x = 0$ *and* $x = \dfrac{\pi}{2}$ *bounded by the graph and the* x*-axis.*

2.7. *Insert figure of the graph of* $y = \cos(2x)$ *with shaded region between* $x = \dfrac{\pi}{4}$ *and* $x = \dfrac{5\pi}{4}$ *bounded by the graph and the* x*-axis.*

2.8. *Insert figure of the graph of* $y = \sin(2x)$ *with shaded region between* $x = \dfrac{\pi}{4}$ *and* $x = \dfrac{3\pi}{4}$ *bounded by the graph and the* x*-axis.*

2.9. *Insert figure of the graph of* $y = \sin(2x)$ *with shaded region between* $x = \dfrac{\pi}{8}$ *and* $x = \dfrac{3\pi}{4}$ *bounded by the graph and the* x*-axis.*

Q3

Calculate the area of the region enclosed by the following lines and curves.

3.1. *Insert figure of the graph of* $y = 5x - 2x^2$ *and* $y = \dfrac{1}{2}x^2$ *with shaded region between* $x = 0$ *and* $x = 2$ *bounded above by* $y = 5x - 2x^2$ *and below by* $y = \dfrac{1}{2}x^2$.

3.2. *Insert figure of the graph of* $y = \sqrt{x} - 1$ *and* $y = \left(\dfrac{1}{3}x - 1\right)^2 - 2$ *with shaded region between* $x = 0$ *and* $x = 9$ *bounded above by* $y = \sqrt{x} - 1$ *and below by* $y = \left(\dfrac{1}{3}x - 1\right)^2 - 2$.

3.3. $y = x^2$ and $y = 2x + 3$.

3.4. $y = 2x + 3$ and $y = 3 - \frac{1}{2}x^2$.

3.5. $y = 4x^2 - 3$ and $y = 3 - 2x$.

3.6. $y = 4\sqrt{x}$ and $y = \frac{1}{2}x^2$.

3.7. $y = 4 - (x - 4)^2$ and $y = x - 2$.

3.8. $y = 5 - 3x^2$ and $y = -3x - 1$.

After attempting the questions above, please click this link to find the answers.

Version history and licensing

v1.0: initial version created 05/25 by Donald Campbell as part of a University of St Andrews VIP project.