A Level Maths

Topic: Area Between Two Curves

Instructions

Answer all questions. Show complete working. Use definite integrals where appropriate. Diagrams are provided where needed.

Practice Questions

1. Find the area enclosed between the curves $y = x^2$ and $y = 2x$.
2. Find the area between the curves $y = \sin x$ and $y = \cos x$ from $x = 0$ to $x = \frac{\pi}{2}$.
3. Determine the area between $y = x^3$ and $y = x$ from $x = 0$ to $x = 1$.
4. Find the area enclosed between $y = e^x$ and $y = x + 1$ from $x = 0$ to $x = 1$.
5. Calculate the area between $y = \ln x$ and $y = 1$ from $x = 1$ to $x = 2$.
6. Find the area between the curves $y = 4 - x^2$ and $y = x$.

Multiple-Choice Questions

1. The area between $y = x$ and $y = x^2$ from $x = 0$ to $x = 1$ is:
   - A. $\frac{1}{3}$
   - B. $\frac{1}{6}$
   - C. $\frac{2}{3}$
   - D. $\frac{1}{2}$

2. Which of the following integrals represents the area between $y = \cos x$ and $y = \sin x$ from $x = 0$ to $x = \frac{\pi}{2}$?

   A. $\int_0^{\frac{\pi}{2}} (\cos x - \sin x)\, dx$

   B. $\int_0^{\frac{\pi}{2}} (\sin x - \cos x)\, dx$

   C. $\int_0^{\frac{\pi}{2}} \cos x\, dx - \int_0^{\frac{\pi}{2}} \sin x\, dx$

   D. All of the above

3. The area between $y = e^x$ and $y = x + 1$ from $x = 0$ to $x = 1$ is closest to:

   A. 0.5

   B. 0.7

   C. 0.9

   D. 1.1

4. The area enclosed between $y = 4 - x^2$ and $y = x$ is found by:

   A. $\int_{-2}^{2} (4 - x^2 - x)\, dx$

   B. $\int_{-1}^{2} (4 - x^2 - x)\, dx$

   C. $\int_{0}^{2} (4 - x^2 - x)\, dx$

   D. $\int_{-2}^{1} (x - (4 - x^2))\, dx$

5. Which of the following expressions gives the area between $y = x^3$ and $y = x$ from $x = -1$ to $x = 1$?

   A. $\int_{-1}^{1} (x^3 - x)\, dx$

   B. $\int_{-1}^{1} |x - x^3|\, dx$

   C. $\int_{-1}^{1} (x - x^3)\, dx$

   D. $\int_{0}^{1} (x - x^3)\, dx$