

C2 Test

You *may* use a calculator. Slovenly work will be penalized.

1. Expand and simplify $(2x - 1)^5$.

$$32x^5 - 80x^4 + 80x^3 - 40x^2 + 10x - 1$$

2. Find the coefficient of x^6 in the expansion of $(\frac{x}{2} - 3)^9$.

$$-\frac{567}{16}$$

3. Find the term independent of x in the expansion of $(x^2 - \frac{2}{x})^{12}$.

$$126, 720$$

4. Evaluate the following integrals:

(a) $\int 2x^3 - 4x + 3 dx$.

$$\frac{x^4}{2} - 2x^2 + 3x + c$$

(b) $\int \sqrt{x}(x^2 + 1) dx$.

$$\frac{2x^{7/2}}{7} + \frac{2x^{3/2}}{3} + c$$

(c) $\int \frac{x^3 - 1}{x^2} dx$.

$$\frac{x^2}{2} + \frac{1}{x} + c$$

5. Find the area enclosed by the curve $y = x^2 + 2x + 4$, the x -axis and the lines $x = 1$ and $x = 2$.

$$\frac{28}{3}$$

6. (a) Use the trapezium rule using 5 ordinates to estimate the following definite integral:

$$\int_1^5 \frac{1}{x+2} dx.$$

$$\frac{359}{420}$$

(b) Will your answer be an over or under-estimate of the true value of the integral?

over-estimate

7. Given that $\frac{dy}{dx} = 4x^3 + 3x^2 - 6x - 2$, and that the curve passes through the point $(3, 2)$, find the equation of the curve.

$$y = x^4 + x^3 - 3x^2 - 2x - 73$$

8. The curves $y = x^2 - 3x + 3$ and $y = 4x - x^2$ cross at A and B , where the x -coordinate of A is smaller than that of B .

(a) Find the coordinates (both x and y bit!) of A and B .

$$A(\frac{1}{2}, \frac{7}{4}), B(3, 3)$$

(b) Find the coordinates of the turning points of both curves.

$$(\frac{3}{2}, \frac{3}{4}), (2, 4)$$

(c) Sketch the curves on the same sketch. [You should find they enclose an area.]

(d) Find the area enclosed between the two curves.

$$\frac{125}{24}$$

9. Find the exact volume of the shape formed when $y = \sqrt{x} + 1$ is rotated around the y -axis, between $y = 1$ and $y = 4$.

$$\frac{243\pi}{5}$$

10. Given that $\int_a^4 x^2 + 2 dx = 27$, find a .

$$a = 1$$