

Pure 43 – Integration: Standard Integrals

Please **complete** this homework by _____. Start it early. If you can't do a question you will then have time to ask your teacher for help or go to a drop in session.

Section 1 – Review of previous topics.

Please complete all questions.

1. Find $\int \left(\frac{2}{x^3} - 3\sqrt{x} \right) dx$
2. Find $\int \left((2x)^2 + \frac{\sqrt{x+5}}{x^2} \right) dx$
3. The curve with equation $f(x)$ passes through the point $(-1, 0)$. Given that $f'(x) = 9x^2 + 4x - 3$, find $f(x)$.
4. Evaluate $\int_1^3 \frac{x^3 + 2x^2}{x} dx$
5. Evaluate $\int_1^4 \frac{2 + \sqrt{x}}{x^2} dx$
6. Given that $\int_1^k \frac{1}{\sqrt{x}} dx = 3$, find the value of the constant k .
7. Find the area enclosed by the curve $y = 4 - 3x - x^2$ and the x axis.
8. Find the roots of the curve $y = x^3 - 5x^2 + 6x$. Find the total area enclosed by the curve and the x axis.
9. The curve $y = x^2 - 3x + 4$ is intersected by the line $y = x + 1$ at two points. Find the coordinates of the two points and the area enclosed by the curve and the line.
10. The curve $y = 2 - x - x^2$ has a tangent at the point where it crosses the y axis. Show that the area enclosed by the curve, the tangent to the curve and the x axis is $\frac{5}{6}$.

Section 2 – Consolidation of this week's topic.

Please complete all questions.

1) Integrate:

a) $\int e^x dx$

b) $\int \frac{1}{x} dx$

c) $\int \cos x dx$

d) $\int \sec^2 x dx$

e) $\int \operatorname{cosec} x \cot x dx$

[5]

2) Integrate:

a) $\int \left(5 - \frac{3}{x}\right) dx$

b) $\int \frac{2e^x+1}{5} dx$

c) $\int \frac{3x+1}{x} dx$

d) $\int \frac{\sin x}{\cos^2 x} dx$

e) $\int \frac{\cos x}{\sin^2 x} dx$

[10]

3) Integrate:

a) $\int (x - 2)^7 dx$

b) $\int (2x + 5)^3 dx$

c) $\int \sqrt{4x - 1} dx$

d) $\int \left(\frac{x}{4} - 2\right)^5 dx$

e) $\int \frac{5}{(3-2x)^2} dx$

[10]

4) Integrate:

a) $\int \frac{1}{2x-1} dx$

b) $\int \frac{2}{3x+5} dx$

c) $\int \frac{3}{2-7x} dx$

[6]

5) Integrate:

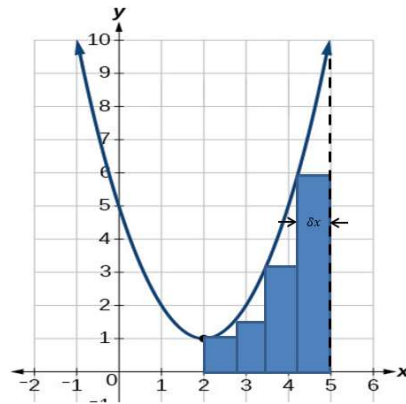
a) $\int (\cos(5x - 2) + 2e^{x+3}) dx$

b) $\int (e^{5-2x} + \sec^2 3x) dx$

c) $\int \left(5 \sin(2x + 3) + \frac{3}{5x-1} + (e^{2x} + 1)^2\right) dx$

[13]

- 6) The area between the curve $y = x^2 - 4x + 5$, the x-axis and the lines $x = 2$ and $x = 5$ is estimated by finding the areas of four rectangles of equal width, δx , as shown below



- (a) Write down the value of δx (1)
- (b) Calculate the area of the largest rectangle (2)
- (c) If the height of rectangle n is y_n , explain what is meant by $\lim_{\delta x \rightarrow 0} \sum y_n \times \delta x$ (2)
- (d) Calculate the exact value of $\lim_{\delta x \rightarrow 0} \sum y_n \times \delta x$ (3)

Total: 52 Marks