

MATHEMATICS ASSIGNMENT FOR L5 ALL

Find the following integrals.

1. $\int(5x^2 - 8x + 5)dx$

2. $\int(-6x^3 + 9x^2 + 4x - 3)dx$

3. $\int(x^{\frac{3}{2}} + 2x + 3)dx$

4. $\int\left(\frac{8}{x} - \frac{5}{x^2} + \frac{6}{x^3}\right)dx$

5. $\int\left(\sqrt{x} + \frac{1}{3\sqrt{x}}\right)dx$

6. $\int(12x^{\frac{3}{4}} - 9x^{\frac{5}{3}})dx$

7. $\int\frac{x^2 + 4}{x^2}dx$

8. $\int\frac{1}{x\sqrt{x}}dx$

9. $\int(1 + 3t)t^2 dt$

10. $\int(2t^2 - 1)^2 dt$

11. $\int y^2 \sqrt[3]{y} dy$

12. $\int d\theta$

13. $\int 7 \sin(x) dx$

14. $\int 5 \cos(\theta) d\theta$

15. $\int 9 \sin(3x) dx$

16. $\int 12 \cos(4\theta) d\theta$

17. $\int 7 \cos(5x) dx$

18. $\int 4 \sin\left(\frac{x}{3}\right) dx$

19. $\int 4e^{-7x} dx$

20. $\int 9e^{\frac{x}{4}} dx$

21. $\int -5 \cos \pi x dx$

22. $\int -13e^{6t} dt$

Q23.

Find $\int \left(x^2 - \frac{1}{x^2} + \sqrt[3]{x} \right) dx$.

(Total 4 marks)

Q24.

Find $\int (2 + 5x^2) dx$.

(Total 3 marks)

Q25.

For the curve C with equation $y = f(x)$,

$$\frac{dy}{dx} = x^3 + 2x - 7.$$

(a) Find $\frac{d^2y}{dx^2}$.

(2)

(b) Show that $\frac{d^2y}{dx^2} \geq 2$ for all values of x .

(1)

Given that the point $P(2, 4)$ lies on C ,

(c) find y in terms of x ,

(5)

(d) find an equation for the normal to C at P in the form $ax + by + c = 0$, where a , b and c are integers.

(5)

(Total 13 marks)

PART 2: INTEGRATE USING SUBSTITUTION METHOD

1. In each case the integrand can be written as $f(g(x))g'(x)$. Identify the functions f and g and use the general result on page 7 to complete the integration.

(a) $\int 2xe^{x^2-5}dx$ (b) $\int -2x \sin(1-x^2)dx$ (c) $\int \frac{\cos x}{1+\sin x}dx$.

2. In each case use the given substitution to find the integral:

(a) $\int -2xe^{-x^2}dx$, $u = -x^2$.

(b) $\int x \sin(2x^2)dx$, $u = 2x^2$.

(c) $\int_0^5 x^3\sqrt{x^4+1}dx$, $u = x^4+1$.

3. In each case use a suitable substitution to find the integral.

(a) $\int 5x\sqrt{1-x^2}dx$ (b) $\int \frac{dx}{\sqrt{x}(1+\sqrt{x})^2}$ (c) $\int x^4(1+x^5)^3dx$

(d) $\int \frac{x^3}{\sqrt{x^4+16}}dx$ (e) $\int \frac{\cos x}{(5+\sin x)^2}$ (f) $\int_0^1 \frac{x^3}{\sqrt{x^4+12}}dx$

(g) $\int 5x^2\sqrt{1-x^3}dx$ (h) $\int e^{\cos x} \sin x dx$ (i) $\int e^{\sin x} \cos x dx$.

GOOD LUCK!!!!!!