SKILLS CHECK

Differentiate y =(4x² – x³)⁴ with respect to x

Find the equation of the perpendicular bisector of (1, -4) and (-5, 4)

$f(x) = \frac{x+2}{x-2}$. Find $f^{-1}(x)$ and state the range of $f^{-1}(x)$

Express $\frac{2}{(x+3)(x+1)}$ in the form $\frac{A}{x+3} + \frac{B}{x+1}$

A curve passes through (3,18) and is such that $\frac{dy}{dx} = \frac{1}{3}x^2 - 4x + 1$

Find y in terms of x

WEEK 1

SKILLS CHECK

QUESTION 1

Find $\dfrac{dy}{dx}$ when $y = \ln(2x - 2x^3)$

QUESTION 2

The line $x + y = k$ where k is a constant is a tangent to the circle $x^2 + y^2 = 2x$.
Find the possible values of k (leave your answers in surd form)

QUESTION 3

Express $4x^2 + 6x - 3$ in the form $a(x + b)^2 + c$
State the range of the function $f(x) = 4x^2 + 6x - 3$

QUESTION 4

Express $\dfrac{x+2}{(x-1)(x-4)}$ in the form $\dfrac{A}{x-1} + \dfrac{B}{x-4}$

QUESTION 5

Find the finite area bounded by the curve $y = 16 - 4x^2$ and the x-axis

WEEK 2

SKILLS CHECK

Differentiate $\sqrt{2x^3 - 2x}$ with respect to x

A circle has equation $x^2 + y^2 - 4y - 14 = 0$. A chord of the circle has length 8. Find the perpendicular distance from the chord to the centre of the circle.

Given that f(x) = x^2 + 1 and g(x) = 3x, solve the equation
fg(x) = gf(x)

Express $\frac{16}{(x+1)(x-3)^2}$ in the form $\frac{A}{x+1} - \frac{B}{x-3} + \frac{C}{(x-3)^2}$

Evaluate $\int_2^4 1 + \frac{4}{x^3}\, dx$

WEEK 3

SKILLS CHECK

QUESTION 1

Find $\frac{dy}{dx}$ when $y = (2e^{2x} - 1)^3$

QUESTION 2

Find the equation of the tangent to the circle $(x + 1)^2 + (y - 3)^2 = 13$ at the point $(2, 5)$

QUESTION 3

The function $f(x) = 16 - 6x - x^2 \qquad x \in \mathbb{R}$
Find the range of $f(x)$

QUESTION 4

Express $\frac{3x-1}{(1-2x)^2}$ in the form $\frac{A}{1-2x} + \frac{C}{(1-2x)^2}$

QUESTION 5

Find the value of the constant c given that
$$\int_0^4 c\sqrt{x}\, dx = 64$$

WEEK 4

SKILLS CHECK

Find $\dfrac{dy}{dx}$ when $y = \cos^3 x$

The line with equation $y = x + c$ is a tangent to the circle
$x^2 + y^2 - 8x + 6y + 17 = 0$
Find the 2 possible values of c

$f(x) = \dfrac{ax+b}{x-b} \qquad x \neq b$
Find $f^{-1}(x)$

Express $\dfrac{3x^2+10x-4}{(x-1)(x+2)}$ in the form $\dfrac{Ax}{x-1} + \dfrac{B}{x+2}$

Evaluate $\int_1^2 \left(\dfrac{8}{x^3} + x^3 \right) dx$

WEEK 5

SKILLS CHECK

Differentiate $y = (\ln x + 4)^{-3}$ with respect to x

The curve C has equation y = x²(x - 1)
The points A and B lie on the curve and have x coordinates -1 and 2 respectively. Find the length of the line AB

$f(x) = 2e^{3x} + 1$
State the range and domain of $f^{-1}(x)$

Express $\frac{6x^3 - x + 6}{2x^2 - 1}$ in the form $Ax + \frac{Bx + C}{2x^2 - 1}$

Find the region enclosed by the curve y = x⁴ + 5 and the line y = 8

WEEK 6

SKILLS CHECK

Find $\dfrac{dy}{dx}$ when $y = \ln(2 - \sin 2x)$

The straight line l_1 has gradient ⅓ and passes through (6,5)
The straight line l_2 is given by $4x + py - 6 = 0$ intersects l_1 at (q, 2). Find the value of p and q

Solve $gf(x) = 0$ where $f(x) = \ln(3x - 1)$ and $g(x) = e^{2x} - 1$

Express $\dfrac{x}{(1+x)(1-2x)}$ in the form $\dfrac{A}{1+x} + \dfrac{B}{1-2x}$

A curve passes through (-1, 0) and is such that $\dfrac{dy}{dx} = 4x^2 - \dfrac{4}{x^3}$

Find y in terms of x

WEEK 7