Differential Equations (Year 1) (From OCR 4722)

Q1, (Jan 2007, Q3)

(i) Find $\int (4x-5)\,dx$. **[2]**

(ii) The gradient of a curve is given by $\frac{dy}{dx} = 4x-5$. The curve passes through the point (3, 7). Find the equation of the curve. **[3]**

Q2, (Jan 2008, Q5)

The gradient of a curve is given by $\frac{dy}{dx} = 12\sqrt{x}$. The curve passes through the point (4, 50). Find the equation of the curve. [6]

Q3, (Jun 2011, Q2)

(i) Find $\int (6x^{\frac{1}{2}} - 1)\,dx$. **[3]**

(ii) Hence find the equation of the curve for which $\frac{dy}{dx} = 6x^{\frac{1}{2}} - 1$ and which passes through the point (4, 17). **[3]**

Q4, (Jun 2012, Q2)

(i) Find $\int (x^2 - 2x + 5)\,dx$. **[3]**

(ii) Hence find the equation of the curve for which $\frac{dy}{dx} = x^2 - 2x + 5$ and which passes through the point (3, 11). **[3]**

Q5, (Jun 2015, Q5)

A curve has an equation which satisfies $\frac{d^2y}{dx^2} = 3x^{-\frac{1}{2}}$ for all positive values of x. The point $P(4, 1)$ lies on the curve, and the gradient of the curve at P is 5. Find the equation of the curve. **[7]**

Q6, (Jun 2018, Q8)

A curve passes through the point (1, 8) and has an equation which satisfies $\frac{dy}{dx} = 2x + \frac{a}{x^3} + 3$ for all non-zero values of x. The area enclosed by the curve, the x-axis, the line $x = 1$ and the line $x = 3$ is 30 square units. Find the value of the positive constant a. **[9]**
