(42 marks)

Q1. Differentiate

(a) $y = (5x - 2)^3$ (b) $y = \frac{2}{5x+2}$ (c) $y = 3\sin 2x$

7 marks

Q2. Integrate

(a) $\int \left(\sqrt{6x+1}\right) dx$ (b) $\int_1^2 \frac{8}{(1-2x)^3}\, dx$ (c) $\int 4\cos x\, dx$

10 marks

Q3. Find the rate of change of the function $f(x) = 4\sin^3 x$ when $x = \frac{5\pi}{6}$

3 marks

Q4. A curve has the equation $y = x^2 - 4x + 7$, find the equation of the tangent to the curve when $x = 5$ 3 marks

Q5. The gradient of a tangent to a curve is given by $\frac{dy}{dx} = 3\cos 2x$.

The curve passes through the point $\left(\frac{7\pi}{6}, \sqrt{3}\right)$.

Find y in terms of x. 4 marks

Q6. Solve $2\sin 2x + \cos x = 0$ where $0 \le x \le 360$ 4 marks

Q7.

(*a*) The expression $3\sin x - 5\cos x$ can be written in the form $R\sin(x+a)$ where $R > 0$ and $0 \le a < 2\pi$.

Calculate the values of R and a. **4**

(*b*) Hence find the value of t, where $0 \le t \le 2$, for which

$$\int_0^t (3\cos x + 5\sin x)\, dx = 3.$$ **7**