

Name: *Solution*

Student Number:

Problem 1

Evaluate the indefinite integral

$$\int \sec^2 \theta \tan^3 \theta d\theta$$

$$\text{let } u = \tan \theta$$

$$du = \sec^2 \theta d\theta$$

$$\begin{aligned} \int \sec^2 \theta \cdot \tan^3 \theta d\theta &= \int u^3 du = \frac{1}{4} \cdot u^4 + C \\ &= \frac{1}{4} \cdot \tan^4 \theta + C \end{aligned}$$

Problem 2

Find the area of the shaded region.

$$\begin{aligned} A &= \int_0^6 (y_T - y_B) dx \\ &= \int_0^6 [2x - (x^2 - 4x)] dx \\ &= \int_0^6 [-x^2 + 6x] dx \\ &= \left[-\frac{x^3}{3} + \frac{6x^2}{2} \right]_0^6 \\ &= \left[-\frac{x^3}{3} + 3x^2 \right]_0^6 \\ &= -\frac{6^3}{3} + 3 \times 36 = 36(-2 + 3) = 36 \end{aligned}$$

