

Name: *Solution*

Student Number:

Problem 1

Find the dimensions of a rectangle with perimeter 100 m whose area is as large as possible.

Let l be the length of the rectangle
and w be its width.

Let P be the perimeter and A be the
area.

$$P = 100 \text{ m} = 2l + 2w \rightarrow w = \frac{100 - 2l}{2}$$

$$A = l \cdot w \quad \boxed{w = 50 - l}$$

$$A = l \cdot w = l \cdot (50 - l) = 50l - l^2$$

$$A' = 50 - 2l$$

Critical numbers: $A' = 0$
 $l = 25$

To check whether we have min or max at $l = 25$, we
are going to use the 2nd derivative test:

$$A'' = -2 < 0$$

So we have a maximum at $l = 25$

Hence, $l = 25$ & $w = 50 - l = 50 - 25 = 25$

So we have a square of side 25.

