1. We want to use 1800 ft of fence to build 8 identical rectangular pig pens in a 2 by 4 formation. What dimensions would maximize the total area? Be sure to prove that you have an absolute maximum.

Constraint is $3x + 5y = 1800$

Maximize objective (area)

$A = xy$

$A = x \cdot \left(\frac{1800 - 3x}{5}\right)$

Domain is $0 \leq x \leq 600$

$A = \frac{1}{5} (1800x - 3x^2)$

Solve for $y$:

$5y = 1800 - 3x$

$y = \frac{1800 - 3x}{5}$

Note $y = 0$ when:

$1800 - 3x = 0$

$1800 = 3x$

$600 = x$

Maximum area when $x = 300$, $y = \frac{1800 - 3(300)}{5} = 180$

Interpretation: The pig pens should be $\frac{x}{4} = 75$ ft by $\frac{y}{2} = 90$ ft.