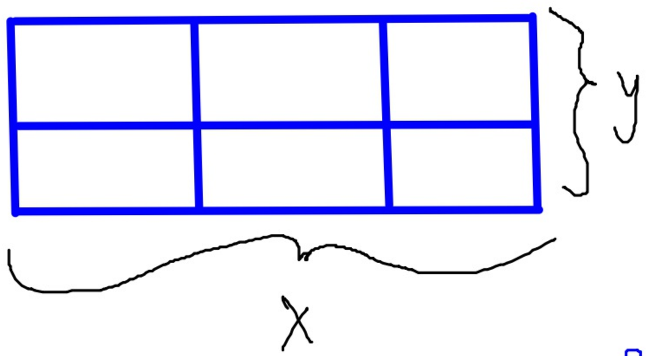

Goal: Max. area

$A = x \cdot y$

$3x + 4y = 480$

Solve for y

$\frac{4y}{4} = \frac{480 - 3x}{4}$

$y = 120 - \frac{3}{4}x$

$A = x\left(120 - \frac{3}{4} \cdot x\right)$

$A = 120x - \frac{3}{4}x^2$

$A' = 120 - \frac{3}{2}x$

$0 = 120 - \frac{3}{2}x$

$\frac{3}{2}x = 120$

$\boxed{x = 80\text{ yd}}$

$y = 120 - \frac{3}{4}(80)$

$\boxed{y = 60\text{ yd}}$

Max area

$A = 80 \cdot 60 = \boxed{4800\text{ yd}^2}$

3 $R(q) = 500q - q^2$

$C(q) = 150 + 10q$

Goal: Find q which maximizes profit

$\pi''(q) = -2$

* Profit $= R(q) - C(q)$

$\pi(q)$

$\pi(q) = (500q - q^2) - (150 + 10q)$

$\pi(q) = -q^2 + 490q - 150$

$\pi'(q) = -2q + 490$

$0 = -2q + 490$

$2q = 490$

$\boxed{q = 245 \text{ units}}$

what is max profit?

$\pi(245) = -(245)^2 + 490(245) - 150$

$\boxed{\pi(245) = \$59{,}875}$

4

$x = 1^{st}$ #

$y = 2^{nd}$ #

Goal: maximize product of #s

$$\text{Product} = x \cdot y$$

$$82 = x + y$$

$$x = 82 - y$$

$$P = y(82 - y)$$

$$P = 82y - y^2$$

$$P' = 82 - 2y$$

$$0 = 82 - 2y$$

$$2y = 82$$

$$\boxed{y = 41}$$

$x = 82 - 41$

$\boxed{x = 41}$

2^{nd} deriv. test

$P'' = -2$

g. max at $y = 41$

(5) $\pi'(q) = -2q^2 + 19q + 10$

$0 = -2q^2 + 19q + 10$

$0 = 2q^2 - 19q - 10$

	q	-10
$2q$	$2q^2$	$-20q$
$+1$	$1q$	-10

$0 = (2q+1)(q-10)$

$q = -\frac{1}{2} \quad q = 10$

$\pi''(q) = -4q + 19$

$\pi''(-\frac{1}{2}) = 2 + 19 = 21$ min

$\pi''(10) = -40 + 19 = -21$ max

$\pi(10) = \$383.33$

A quantity of 10 units should be produced to maximize profit The maximum profit is \$383.33

6 $q = 100 - 25p$

$R = p \cdot q$

$R = p \cdot (100 - 25p)$

The price that will lead to the maximum revenue is $2 per cookbook. The maximum revenue is $100.

$R = 100p - 25p^2$

$R' = 100 - 50p$

$R'' = -50$

$p = 2$ is a G. Max

$0 = 100 - 50p$

$50p = 100$

$p = 2$

$R(2) = 100(2) - 25(2)^2$

$R(2) = 200 - 100 = 100$

7) $p = 8$ $C(q) = 20 + 2q + 0.01q^2$ $\pi''(q) = -.02$

$R = p \cdot q$

$\pi(q) = R(q) - C(q)$

$\pi(q) = 8q - (20 + 2q + 0.01q^2)$

$\pi(q) = -0.01q^2 + 6q - 20$

$\pi'(q) = -0.02q + 6$

$0 = -0.02q + 6$

$0.02q = 6$ G. max

$\boxed{q = 300}$

$\boxed{\pi(300) = \$880}$

The company should produce 300 sunglasses to maximize profit.
The maximum profit is \$880.