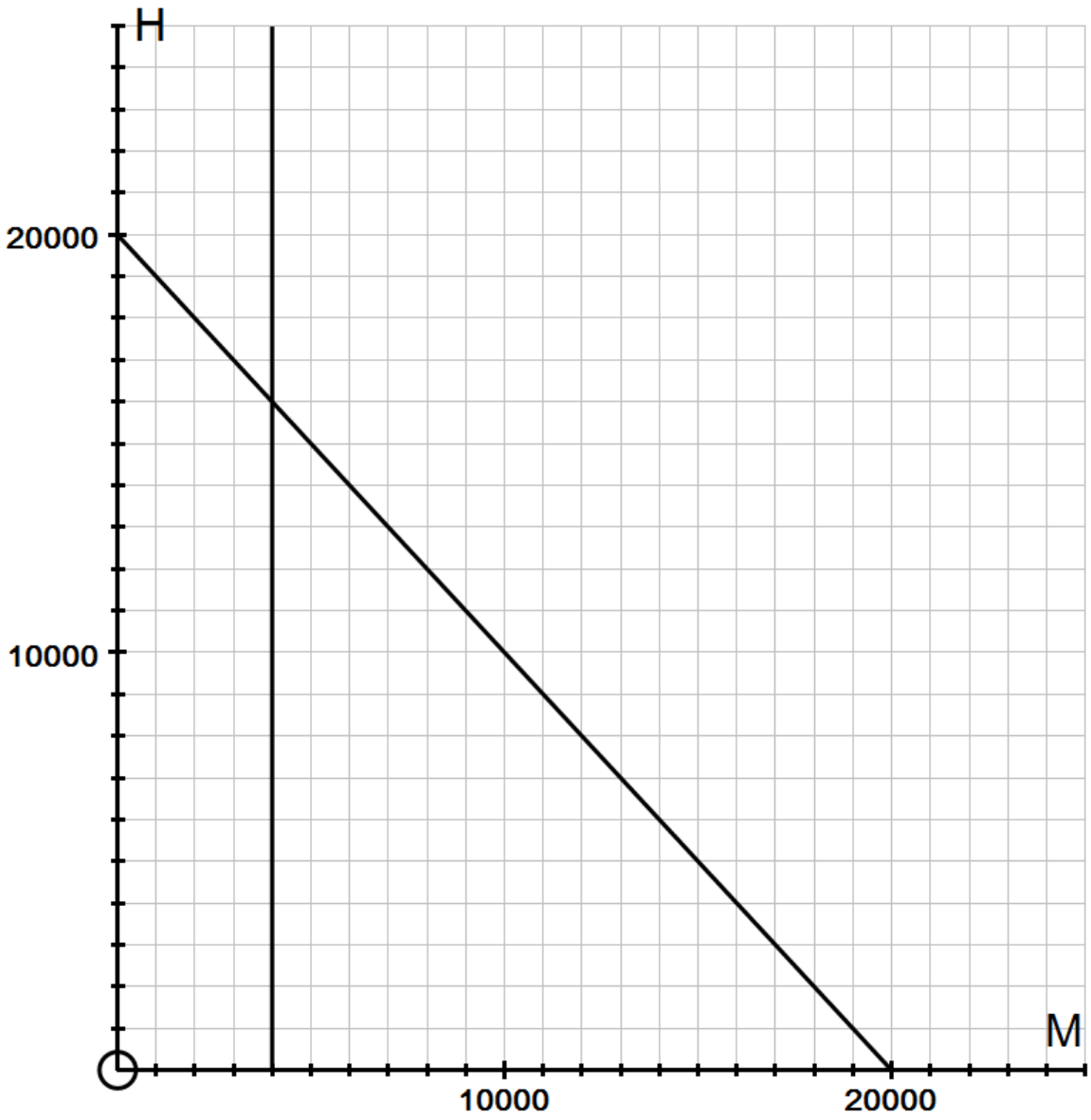
Practice for L3 Linear Programming #2

Bingabonga make board shorts in two styles, the *Manly* and the *Hunky*.
They are under contract to make at least 4,000 *Manly* and 6,000 *Hunky* each month.
They have only enough sewing machines to make 20,000 shorts per month in total.
Materials cost $30 for the *Manly* and $40 for the *Hunky*, out of a monthly budget of $720000.
Bingabonga make a profit of $20 per each *Manly* sold and $25 for each *Hunky* sold.

The production constraints can be written by the inequations:

$M \geq 4\,000$ $H \geq 6\,000$ $M + H \leq 20\,000$ $30M + 40H \leq 720\,000$

Graph these constraints on the grid (which has been started) and indicate the feasible region.



Show what Bingabonga need to make each month to maximise their profit using the objective formula, P = 20M + 25H.

Question 2

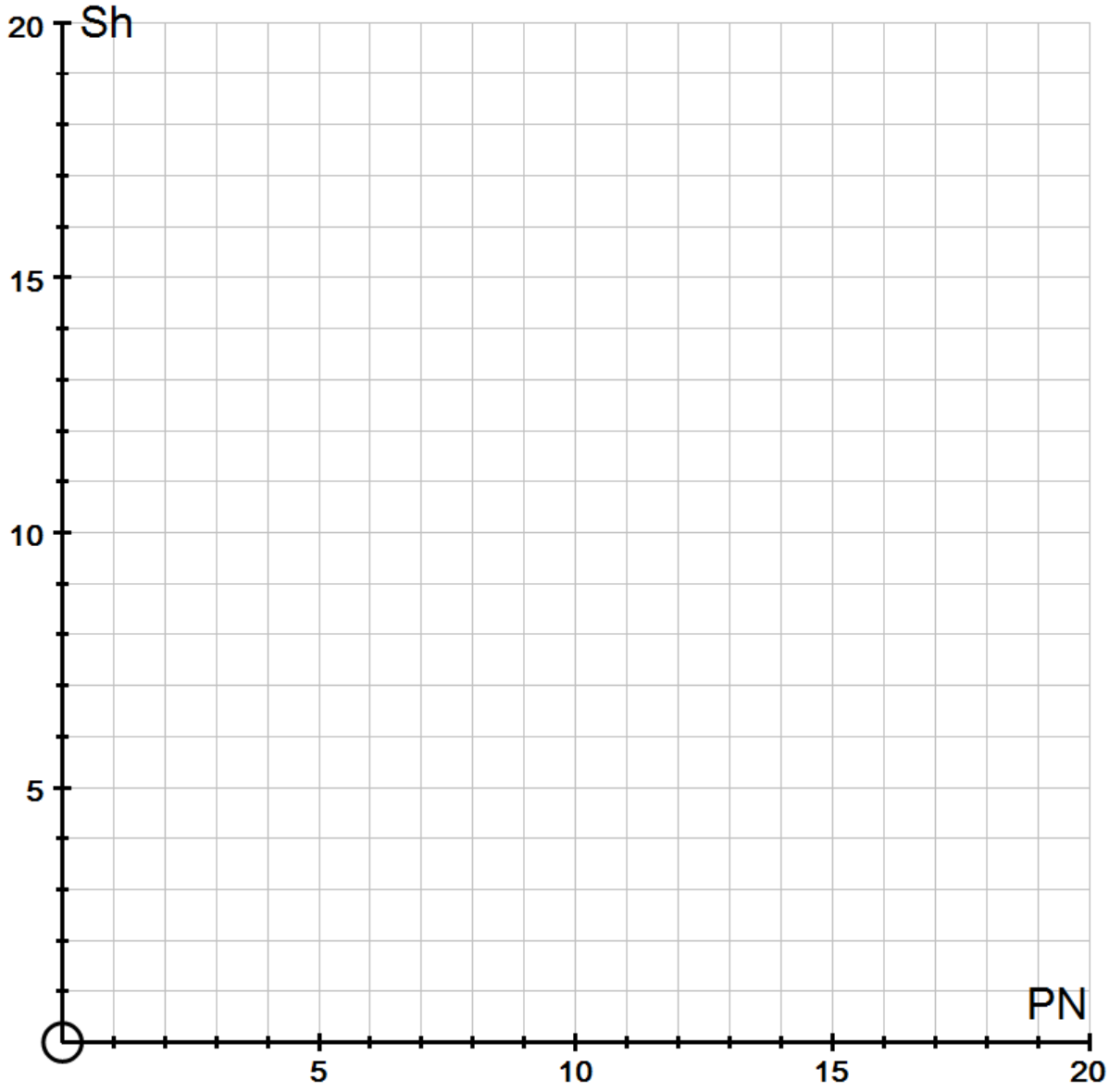
Bingabonga want to buy up to 10 pressing machines. They have decided that two manufacturers suit their needs: *Perfect Machines* and *Sensational Presses*.

They have $200 000 to spend on the presses. Each *Perfect Machines* costs $40 000 and each *Sensational Presses* costs $10 000.

Estimated output is 8 000 per month for each *Perfect Machines* and 6 000 for each *Sensational Presses*.

Write a system of inequalities that describe this system.

Graph these constraints on the grid and indicate the feasible region.

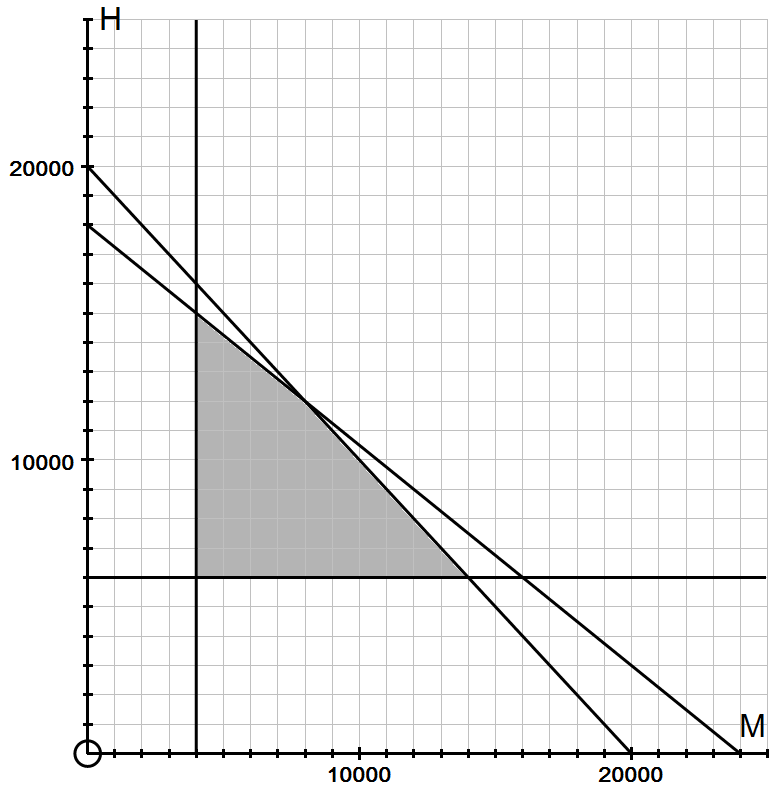


Calculate the amount of each type they should buy to maximise their monthly output.

The salesmen at *Perfect Machines* suggest that with a little tweaking their output could be improved, so that no *Sensational Presses* machines would be needed.

What output would the *Perfect Machines* presses need to have so that output was maximised using only them?

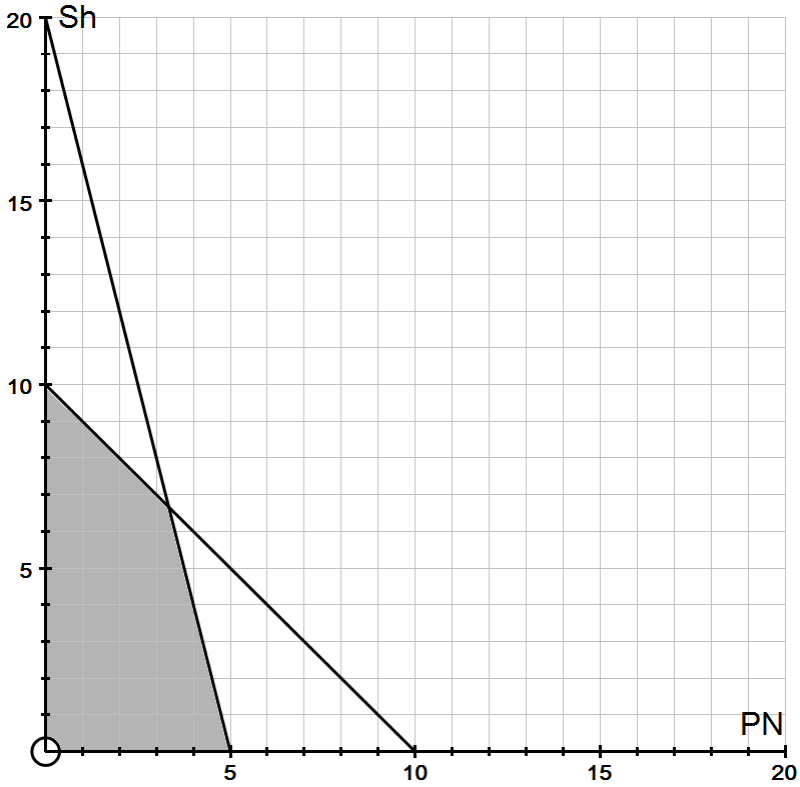
Answers: Practice for L3 Linear Programming #2



Vertex	Profit
(4 000, 15 000)	$455 000
(8 000, 12 000)	$460 000
(14 000, 6 000)	$430 000

Maximum profit is $460,000 per month, which occurs when they make 8,000 pairs of Manly and 12,000 pairs of Hunky. A

PN ≥ 0 **SP ≥ 0** **PN + SP ≤ 10** **40,000 PN + 10,000 SP ≤ 200,000**



Output = 8 000 PN + 6 000 SP

Vertex	Output
(0, 10)	60 000
(3⅓, 6⅔)	66 666
(5, 0)	40 000
Near to (3⅓, 6⅔) vertex	
(3, 7)	66 000
(4, 4)	56 000

Maximum output is from 3 *Perfect Machines* and 7 *Sensational Presses* machines.

When $x \times 5 > x \times 3 + 6000 \times 7$. Solving gives $x > 21\,000$.

The PN machines would need an output of greater than 21 000 a month.