A2 Maths with Decision Test (rho)Versions OPQ and R (they were all the same question so only do this once)

A company produces mugs and plates for local souvenir shops. The plates and mugs are manufactured in a two stage process. Each day there are 300 minutes available for the completion of the first stage and 400 minutes available for the completion of the second stage. In addition, the mugs require some hand painting. There are 150 minutes available for hand painting.

Product	Stage 1	Stage 2	Hand painting
Plate	2.5	5	-
Mug	3	2	2

The above table shows the production time, in minutes, for the plates and mugs.
All plates and mugs are sold. The profit on each plate sold is £2 and the profit on each mug sold is £4.The company wishes to determine how many plates and mugs to make so as to maximise its profit each day.

Let x be the number of plates sold and y be the number of mugs made each day.

a) Write down three constraints, other than $x \geq 0$ and $y \geq 0$, satisfied by x and y.
b) Write down the objective function to be maximised.
c) Using the graphical method, solve the resulting linear programming problem.
d) Use graph paper.
e) Determine the optimal number of plates and mags to be made each day.
f) Determine the resulting profit
g) When the optimal solution is adopted, determine which, if any, of the stages has available time which is unused.
h) State the amount of unused time.

3. a) $5x + 6y \leq 600, 5x + 2y \leq 400, y \leq 75$
b) $2x + 4y$

4. b) (30,75) c) 360 c) 100 minutes unused