a)

Winst = opbrengst – kost

$$\text{Winst} = \text{W}(\text{R},\text{P}) = 400.\left(\frac{160.\text{R}}{160+\text{R}} + \frac{320.\text{P}}{80+\text{P}}\right) - 100.\text{R} - 100.\text{P}$$

$w(r,p) := 400\cdot\left(\frac{160\cdot r}{160+r}+\frac{320\cdot p}{80+p}\right)-100\cdot r-100\cdot p$ *Done*

$dwdr(r,p) := \frac{d}{dr}(w(r,p))$ *Done*

$dwdp(r,p) := \frac{d}{dp}(w(r,p))$ *Done*

⚠ $\text{solve}\left(\begin{cases} dwdr(r,p)=0 \\ dwdp(r,p)=0 \end{cases}, r, p\right)$

$r=-480$ and $p=-400$ or $r=-480$ and $p=240$ or $r=160$ and $p=-400$ or $r=160$ and $p=240$

Negatieve R of P: onmogelijk.

Enige kritisch punt: (R = 160 ; P = 240).

Aard van de kritisch punt bepalen:

$dwdrr(r,p) := \frac{d^2}{dr^2}(w(r,p))$ *Done*

$dwdpp(r,p) := \frac{d^2}{dp^2}(w(r,p))$ *Done*

$dwdrp(r,p) := \frac{d}{dr}\left(\frac{d}{dp}(w(r,p))\right)$ *Done*

$h(r,p) := \det\begin{bmatrix} dwdrr(r,p) & dwdrp(r,p) \\ dwdrp(r,p) & dwdpp(r,p) \end{bmatrix}$ *Done*

⚠ $h(160,240)$ $\frac{25}{64}$

De Hessiaan is > 0, dus we moeten het getal links boven in de Hessiaan controleren:

$dwdrr(160,240)$ $\frac{-5}{8}$

Dat getal is < 0, dus de winst = W(R , P) heeft een maximum in (R = 160 ; P = 240).

Die maximale winst is:

$w(160,240)$ 88000

b)

Bepaal het maximum van Winst $= \mathrm{W(R,P)} = 400.\left(\frac{160.\mathrm{R}}{160+\mathrm{R}} + \frac{320.\mathrm{P}}{80+\mathrm{P}}\right) - 100.\,\mathrm{R} - 100.\,\mathrm{P}$

Onder de voorwaarde dat g(R,P) = c <-> 100.R + 100.P = 32000

$w(r,p) := 400 \cdot \left(\frac{160 \cdot r}{160+r} + \frac{320 \cdot p}{80+p}\right) - 100 \cdot r - 100 \cdot p$ *Done*

$g(r,p) := 100 \cdot r + 100 \cdot p$ *Done*

$\text{solve}\left(\begin{cases} g(r,p) = 32000 \\ \frac{d}{dr}(w(r,p)) = la \cdot \frac{d}{dr}(g(r,p)) \\ \frac{d}{dp}(w(r,p)) = la \cdot \frac{d}{dp}(g(r,p)) \end{cases}, r, p, la\right)$ $r=120$ and $p=200$ and $la=\frac{15}{49}$

$w(120,200)$ $\frac{608000}{7}$

$\frac{608000}{7}$ 86857.1

De winst is maximaal bij R = 12000 euro en P = 20000 euro. De maximale winst is dan 86857.1 euro.