**Problem set 3 (#4)** by Natalia Roszczypała

 Up(xp1, xp2) = xp11/3xp22/3  ωP1 = 1 ωP2 = 0

 Uj(xj1, xj2) = xj11/2xj21/2 ωJ1 = 0 ωJ2 = 1

MRSp = $\frac{\frac{1}{3} x\_{p1}^{-2/3}x\_{p2}^{2/3}}{\frac{2}{3}x\_{p1}^{1/3}x\_{p2}^{-1/3}}$ = $\frac{1}{2}$ $\frac{x\_{p2}}{x\_{p1}}$

MRSj = $\frac{\frac{1}{2}x\_{j1}^{-1/2}x\_{j2}^{1/2}}{\frac{1}{2}x\_{j1}^{1/2}x\_{j2}^{-1/2}}$ = $\frac{x\_{j2}}{x\_{j1}}$

for Cobb-Douglas utility function the demand function can be determined using the formula

$\frac{x\_{p2}}{2x\_{p1}}$ = $\frac{p\_{1}}{p\_{2}}$ U(x1, x2) = x1ax21-a

xp1( p1, p2, Up) = $\frac{1}{3} \frac{m\_{p}}{p\_{1}}$ x1(p1, p2, ma) = a $\frac{m}{p\_{1}}$

xp2( p1, p2, mp) = $\frac{2}{3} \frac{m\_{p}}{p\_{2}}$ x2(p1, p2, ma) = (1-a) $\frac{m}{p\_{2}}$

$\frac{x\_{j2}}{x\_{j1}}$ = $\frac{p\_{1}}{p\_{2}}$

xj1(p1, p2, mj) = $\frac{1}{2} \frac{m\_{j}}{p\_{1}}$

xj2(p1, p2, mj) = $\frac{1}{2} \frac{m\_{j}}{p\_{2}}$

In equilibrium income of each consumer equals his/her endowment:

mp = p1 ωP1 + p2 ωP2 = 1p1 + 0p2 = p1

mj = p1 ωJ1 + p2 ωJ2 = 0p1 + 1p2 = p2

Aggregate excess demand becomes: z(p1, j1) = xp1 + xj1 $- ω\_{p1}- ω\_{j1}$

z(p1, j1) = $\frac{1}{3} \frac{m\_{p}}{p\_{1}}$ + $\frac{1}{2} \frac{m\_{j}}{p\_{1}}$ - ωP1 - ωJ1 =$\frac{1}{3}+ \frac{1}{2} \frac{p\_{2}}{p\_{1}}-1$ $= \frac{1}{2} \frac{p\_{2}}{p\_{1}}- \frac{2}{3}$

In order to calculate equilibrium price we have to use the Walras’ Law: z(p1, j1)=0

$\frac{1}{2} \frac{p\_{2}}{p\_{1}}- \frac{2}{3}$ = 0

$\frac{p\_{2}}{p\_{1}}= \frac{4}{3}$ SOLUTION