Answer Key for Assignment #1

I. Multiple Choice

1-5: D E A(B) A C   6-10  C E B C C  11-15  E E(D) D A D

II. Problem

(a) Given the production functions, we know,

\[ L_f = F^2 \] and \[ L_c = C^2 \]

therefore,

\[ PPF : L_f + L_c = F^2 + C^2 = 100 \] (1')

Total Differentiate PPF:

\[ 2F \frac{\partial F}{\partial C} + 2C \frac{\partial C}{\partial C} = 0 \]

Thus, the MRT is given by,

\[ \text{MRT} = \frac{\partial F}{\partial C} = -\frac{C}{F} \] (the "-" sign can be omitted, so can MRS) (1')

Similarly, since

\[ F \frac{\partial L}{\partial L} + L \frac{\partial F}{\partial F} = 0 \]

on any IC,

\[ \text{MRS} = \frac{\partial F}{\partial C} = -F/C \] (1')

(b) The Equilibrium is given by MRT=MRS which is also on PPF

\[ \begin{aligned}
\text{MRT} &= \text{MRS} \\
\Rightarrow -C/F &= -F/C
\end{aligned} \] (1')

On PPF

\[ F^2 + C^2 = 100 \] (1')

We thus has the autarky allocation,

\[ C = F = 5\sqrt{2} \] (1')

With the autarky price given by MRT(MRS) at this point

\[ \frac{p_c}{p_f} = \frac{C}{F} = 1 \] (1')

(c) Given the international price, the production allocation is

\[ \begin{aligned}
\text{MRT} &= \frac{p_c}{p_f} \\
\Rightarrow C/F &= 2
\end{aligned} \] (1')

On PPF

\[ F^2 + C^2 = 100 \] (1')

While the optimal consumption bundle \((C^*,F^*)\) is given by

\[ \begin{aligned}
\text{MRS} &= \frac{p_c}{p_f} \\
\Rightarrow C^*/F^* &= 2
\end{aligned} \]

Budget Constraint:

\[ \frac{p_c}{p_f} \cdot C^* + F^* = \frac{p_c}{p_f} \cdot C + F \]

\[ \begin{aligned}
C^* &= 2.5\sqrt{5} \\
F^* &= 5\sqrt{5}
\end{aligned} \] (1')

Now is it obvious that Home country will

\[ \begin{aligned}
\text{export clothing by: } 4\sqrt{5} - 2.5\sqrt{5} &= 1.5\sqrt{5} \quad (1')
\text{importing food by: } 5\sqrt{5} - 2\sqrt{5} &= 3\sqrt{5} \quad (1')
\end{aligned} \]