Pen and Paper exercise - Solution.

$$\frac{d[F6P]}{dt} = V_{Carbon\,Influx} - V_{Pfk} = V_{Carbon\,Influx} - V_{max\,Pfk} \frac{[F6P]}{K_{M\,Pfk} + [F6P]}$$

$$\frac{d[PEP]}{dt} = V_{Pfk} - V_{Pyk} = V_{max\,Pfk} \frac{[F6P]}{K_{M\,Pfk} + [F6P]} - V_{max\,Pyk} \frac{[PEP]}{K_{M\,Pyk} + [PEP]}$$

Values of F6P and PEP in steady state, using the parameters of Table 2.

- $$\frac{d[F6P]}{dt} = 0 \quad (\Rightarrow) \quad V_{Carbon\,Influx} = V_{Pfk} \quad (\Leftrightarrow) \quad 2 = 5\frac{[F6P]_o}{0,16 + [F6P]_o} \quad (\Leftrightarrow)$$

$$0,32 + 2[F6P]_o = 5[F6P]_o \quad (\Leftrightarrow) \quad \boxed{[F6P]_o \simeq 0,1067 \; \mu M} \quad ①$$

- $$\frac{d[PEP]}{dt} = 0 \quad (\Leftrightarrow) \quad V_{Pfk} = V_{Pyk} \underset{[F6P]_o = 0,1067}{\overset{①}{\Longleftrightarrow}} \; 5\frac{0,1067}{0,16 + 0,1067} = 5\frac{[PEP]_o}{0,31 + [PEP]}$$

$$0,4 = \frac{[PEP]_o}{0,31 + [PEP]_o} \quad (\Leftrightarrow) \quad \boxed{[PEP]_o = 0,2067 \; \mu M}$$