Numerical Example : Corrected Solution

$C = 50 + 0.8\, Y^d$

$I = 60 + 0.25\, Y$

$G = 30$

$T = 0.1\, Y$

$R = 25 - 0.15\, Y$

$X = 50$

$M = 10 + 0.1\, Y$

Trick : To double-check the solution, just compute Y^* and compare results obtained from 2 approaches. IF you do both correctly, both results will be identical.

Approach #1 : $Y = DAE$

$$Y = DAE = C + I + G + X - M = 50 + 0.8\boxed{Y^d} + 60 + 0.25Y + 30 + 50 - 10 - 0.1Y$$

NOTE : $\boxed{Y^d} = Y - T - tY + R - rY = Y - 0.1Y + 25 - 0.15Y = \boxed{0.75Y + 25}$

$$Y = DAE = 50 + 0.8(\boxed{0.75Y + 25}) + 60 + 0.25Y + 30 + 50 - 10 - 0.1Y$$

$$= 50 + 0.6Y + 20 + 60 + 0.25 + 30 + 50 - 10 - 0.1Y$$

$$= 0.75Y + 200$$

$$(1 - 0.75)Y = 200 \Rightarrow \boxed{Y^* = \frac{200}{0.25} = 800}$$

Approach #2 : Injection = Leakage

$$\underbrace{S + T + M}_{\text{Leakage}} = \underbrace{I + G + R + X}_{\text{Injection}}$$

$$S = Y^d - C = Y^d - (C_a + bY^d) = Y^d - C_a - bY^d = (1-b)Y^d - C_a$$

$$= (1 - 0.8)Y^d - 50$$

And in this case, $Y^d = Y - T - tY + R - rY = Y - 0.1Y + 25 - 0.15Y = \boxed{0.75Y + 25}$

$$\boxed{S} = (1 - 0.8)(\boxed{0.75Y + 25}) - 50 = \boxed{0.15Y - 45}$$

At the equilibrium, $S + T + M = I + G + R + X$

$$0.15Y - 45 + 0.1Y + 10 + 0.1Y = 60 + 0.25Y + 30 + 25 - 0.15Y + 50$$

$$0.35Y - 35 = 0.1Y + 165$$

$$0.25Y = 200$$

$$\boxed{Y^* = \frac{200}{0.25} = 800}$$