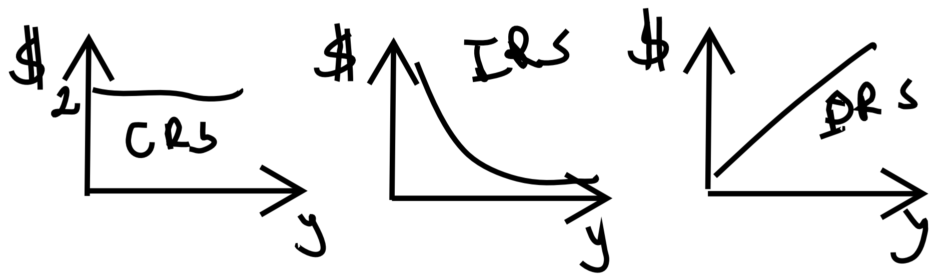
and marginal costs are

$$
\begin{aligned}
MC(y) &= 2 \\
MC(y) &= 2\frac{1}{\sqrt{y}} \\
MC(y) &= 4y
\end{aligned}
$$



Problem 3 (Perfect Substitutes)

a) what are the returns to scale for each function?

$$
\begin{aligned}
F(\lambda K, \lambda L) &= \lambda K + \lambda 0.5L = \lambda\left(K + 0.5L\right) \text{ (CRS)} \\
F(K, L) &= \left(\lambda K + \lambda 0.5L\right)^2 = \lambda^2\left(K + 0.5L\right)^2 \text{ (IRS)} \\
F(K, L) &= \sqrt{(\lambda K + \lambda 0.5L)} = \sqrt{\lambda}\sqrt{(K + 0.5L)}\text{(DRS)}
\end{aligned}
$$

b) Given the first production function $F(K, L) = (K + 0.5L)$ characterized by CRS, capital is more productive and costs the same $L = 0$,

$$y = K$$

and hence the cost function

$$C(y) = w_K K + w_L L = 1y + 1 \times 0 = y$$

Also in the case of $y = [K + 0.5L]^2$ (IRS) again in optimum $L = 0$ and hence $y = K^2$and hence

$$K = \sqrt{y}$$

and hence the cost function

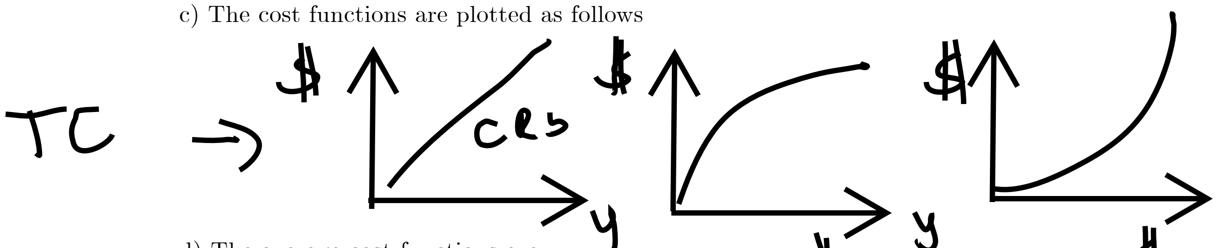
$$C(y) = w_K K + w_L L = 1 \times K = \sqrt{y} = \sqrt{y}$$

Finally for production function $F(K, L) = \sqrt{(K + 0.5L)}$characterized by DRS again $L = 0$ and hence

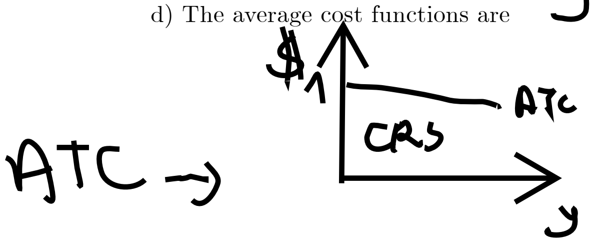
$$y = \sqrt{K} \Rightarrow K = y^2$$

$$C(y) = w_K K + w_L L = 1 \times K + 1 \times 0 = y^2$$

c) The cost functions are plotted as follows



d) The average cost functions are



$$
\begin{aligned}
AC(y) &= 1 \\
AC(y) &= \frac{1}{\sqrt{y}} \\
AC(y) &= y
\end{aligned}
$$