

#Output Side Economics: Single input single output production function worked out problem complete solution. Author: Bijesh Mishra. #

restart;

Digits := 3;

Digits := 3 (1)

Quadratic Production Function:

$x := x$; $c1 := 2512$; $c2 := 180$; $c3 := -1.5$; $c4 := 0$; $p := p$; $r := r$; $b := 0$; $Y := Y$; # Y is the LHS of the production function.

$x := x$; $c1 := 2512$; $c2 := 180$; $c3 := -1.5$; $c4 := 0$; $p := 2$; $r := 2000$; $b := 0$; $Y := Y$;

Y is the LHS of the production function.

$x := x$

$c1 := 2512$

$c2 := 180$

$c3 := -1.5$

$c4 := 0$

$p := 2$

$r := 2000$

$b := 0$

$Y := Y$

(2)

$quad := c1 \cdot x + c2 \cdot x^2 + c3 \cdot x^3 + c4 - Y$;

I substracted Y from the production function for easier calculation of inverse function.

$quad := -1.5 x^3 + 180 x^2 - Y + 2512 x$ (3)

Cobb Douglas Production Function:

$Z := Z$; $m := m$;

change values here to change the Cobb Douglas function equation given by eq. 3. and change eq. 6 to "cobb" to run optimization using cobb douglas production function with two input and onw output.

$Z := Z$

$m := m$

(4)

$cobb := Z \cdot x^m - Y$;

Cobb Douglas Production Function. I substracted Y from the production function for easier calculation of inverse function.

$cobb := Z x^m - Y$ (5)

$Variable_cost := r \cdot x$; $Total_Cost := Variable_cost + b$;

$Variable_cost := 2000 x$

$Total_Cost := 2000 x$

(6)

Change Production Function:

$y := cobb$; #quad or cobb.

$y := Z x^m - Y$

(7)

$LHS := Y$; # this is y of the production function. I addressed this issue by subtracting Y from the production fnction manually. But Maple should have better code that this.

$xStar := solve(y=0, x)$;

$$xStar := e^{\frac{\ln\left(\frac{Y}{Z}\right)}{m}} \quad (8)$$

Variable Cost Function:

$Variable_cost_Star := eval(Variable_cost, x = xStar);$

#Minimum cost of producing a given level of output is equivalent to $K \cdot Y^{\left(\frac{1}{m}\right)}$ and K is constant.

$$Variable_cost_Star := 2000 e^{\frac{\ln\left(\frac{Y}{Z}\right)}{m}} \quad (9)$$

$Cobb_simple := simplify(Variable_cost_Star);$

#For Cobb Douglas Production function. Quadratic Function might not need simplification.

$$Cobb_simple := 2000 \left(\frac{Y}{Z} \right)^{\frac{1}{m}} \quad (10)$$

Comparative Static # Not given in Note.