Econ 301
Intermediate Microeconomics
Prof. Marek Weretka

Problem set 8
(due Tuesday March 27 th, before class)

Problem 1 (Cost functions)
Consider the following production functions:

$$\begin{aligned} F(K,L) &= K^2L^2 \\ F(K,L) &= K^{\frac{1}{3}}L^{\frac{2}{3}} \\ F(K,L) &= K^{\frac{1}{4}}L^{\frac{1}{4}} \end{aligned}$$

a) what are the returns to scale for each function (use formal argument with λ)?
Let $w_L = w_K = 1$
b) Find the cost functions for each of the production functions.
c) Plot the cost function on the same graph with y on the horizontal axis and cost on the vertical one.
d) Find and plot the average and marginal cost functions with y on the horizontal axis and average cost on the vertical one.

Problem 2 (Perfect complements)
Consider the following production functions:

$$\begin{aligned} F(K,L) &= \min(K,L) \\ F(K,L) &= [\min(K,L)]^2 \\ F(K,L) &= \sqrt{\min(K,L)} \end{aligned}$$

a) what are the returns to scale for each function (use formal argument with λ)?
Let $w_L = w_K = 1$
b) Find the cost functions for each of the production functions.
c) Plot the cost function on the same graph with y on the horizontal axis and cost on the vertical one.
d) Find and plot the average and marginal cost functions with y on the horizontal axis and average cost on the vertical one.

Problem 3 (Perfect substitutes)
Consider the following production functions:

$$\begin{aligned} F(K,L) &= K + 0.5L \\ F(K,L) &= [K + 0.5L]^2 \\ F(K,L) &= \sqrt{K + 0.5L} \end{aligned}$$

a) what are the returns to scale for each function (use formal argument with λ)
Let $w_L = w_K = 1$
b) Find the cost functions for each of the production functions.
c) Plot the cost function on the same graph with y on the horizontal axis and cost on the vertical one.
d) Find and plot the average and marginal cost functions with y on the horizontal axis and average cost on the vertical one.