6. Consider a high end luxury car manufacturer, Simp Automotive Group, or SAG. SAG makes one model of car, the SAG cruiser, at a factory in Detroit. Suppose SAG’s production function is $f(K, L) = 0.5K^{0.5}L^{0.25}$. Suppose the wage rate of labor is $w = 25$ and the rental rate of capital is $r = 50$.

(a) Set up and solve SAG’s cost minimization problem treating $Q$ as an unknown constant and in addition find the value of $\lambda$ as a function of $Q$.

(b) Using your answer to the previous part, find SAG’s long run cost function, $LRC(Q)$.

(c) Find SAG’s marginal cost function (i.e. the derivative of their cost function). How does this compare to the function you found for $\lambda$ in part a)?

(d) Suppose that SAG currently has $K = 25$ units of captial. Set up and solve SAG’s cost minimization problem holding captial fixed at $K = 25$. *Hint: you don’t need to do calculus in this problem.

(e) Using your answer to the previous part, find SAG’s short run cost function, $SRC(Q)$.

(f) Which is higher, short run costs or long run costs? Does the value of $Q$ matter?