Micro 2 -Problem Set 3

Question 1:

Consider a firm with the following production function $f(l,k) = l^{1/4} \cdot k^{3/4}$ that faces inputs prices $p_l = 8$ and $p_k = 24$
Derive the cost minimizing inputs bundle $(l(q_0), k(q_0))$ and the cost function $C(q_0)$.

Question 2:

Consider a firm with the following production function $f(l,k) = l^a \cdot k^b$.

1. Derive the cost minimizing inputs bundle $(l(q_0), k(q_0))$ as a function of the parameters p_l, p_k, a, and b.
2. Derive the cost function $C(q_0)$ as a function of the parameters p_l, p_k, a, and b.
3. For a given q_0 how does $(l(q_0), k(q_0))$ changes as the price ratio $\frac{p_l}{p_k}$ increases?
4. For a given q_0 how does $(l(q_0), k(q_0))$ changes as the price ratio $\frac{a}{b}$ increases?
5. Provide a verbal economic explanation for caluses 3 and 4.

Question 3:

Consider a firm with the following production function $f(l,k) = \sqrt{l} + k$ and inputs prices are $p_l = 2$ and $p_k = 8$

1. Derive the cost minimizing inputs bundle $(l(q_0), k(q_0))$.
2. Derive the cost function $C(q_0)$.

Question 4:

Consider a firm with the following production function $f(l,k) = a \cdot l + b \cdot k$.

1. Derive the cost minimizing inputs bundle $(l(q_0), k(q_0))$ as a function of the parameters p_l, p_k, a, and b.
2. Derive the cost function $C(q_0)$ as a function of the parameters p_l, p_k, a, and b.
3. For a given q_0 how does $(l(q_0), k(q_0))$ changes as the price ratio $\frac{p_l}{p_k}$ increases?
4. For a given q_0 how does $(l(q_0), k(q_0))$ changes as the price ratio $\frac{a}{b}$ increases?
5. Provide a verbal economic explanation for caluses 3 and 4.

Question 5:

Explain why the following properties of the cost function $C(q) = p_l \cdot l(q) + p_k \cdot k(q)$ are true:

1. The cost function is homogenous of a degree 1. That is if we look at prices p_l and p_k and multiply them by some positive number $t > 0$ then the cost is also multiplied by t.
2. The cost function is increasing in p_l, in p_k, and in q.