Ex 1 A particular manufacturer's productivity (in millions of units produced) is modeled well by the function $P(K, L) = 0.3(0.4K^{-0.5} + 0.6L^{-0.5})^{-2}$ where K is millions of dollars of capital investment, and L is thousands of worker-hours every month. Find and interpret the value of $P_K(10, 6)$.

Ex 2 Local demand for grapefruit is given by $f(p, n) = 10 + \frac{5}{p+2} + 3e^{0.4n}$ while demand for oranges is $g(p, n) = 7 - \frac{4}{p+6} - 2n$, where each demand is given in thousands of units per month at p dollars per pound for grapefruit and n dollars per pound for oranges. Are grapefruit and oranges substitute, complementary, or neither?

Ex 3 Suppose that, at a particular factory, its output is given by the function $Q(K, L) = 60K^{0.3}L^{0.7}$ thousand units, where K represents capital investment in millions of dollars, and L represents thousands of workers. Suppose in addition, that the factory has \$3 million in capital investment and employs 5 thousand workers. Estimate the increase in output if another million dollars is invested in capital. Estimate the increase in output if another thousand workers are hired. Which would be a more effective way of increasing output?

Ex 4 Suppose you manage a store that has two brands, A and B, of the same product. Brand A costs x dollars per unit and brand B costs y dollars per unit. You know that demand for brand A is given by $Q(x, y) = 300 - 20x^2 + 30y$ units and you also know that the price of brand A will be $x = 2 + 0.05t$ and the price of brand B will be $y = 2 + 0.1\sqrt{t}$ in t months. At what rate is demand for brand A changing with respect to time?