1. (5 points) Consider a firm that has cost function of:

\[ TC = 18 + 8Q + .5 Q^2 \]

a) Draw the average cost and marginal cost curves for this firm (label with equation).
b) Draw the supply curve of this firm
c) What are the profits of the firm if the price of output is $26?

2. (10 points) For this problem, please use a continuous cost function and allow the firm to produce non-integer units of output. Consider a firm with production function:

\[ Q = 8 K^{2} L^{6} \]

And which faces a wage of $10/unit and a rental rate on capital of $30/unit.

a) Please write the long-run cost function of this firm.
b) Please write the equation for the long-run marginal cost function and the long run average cost function of this firm.
c) In the long-run, how much will this firm offer to the market and what are the profits of the firm when the price of output is $10?
d) Please write the short-run cost function, the short-run marginal cost function, and the short-run average cost function of the firm when capital is fixed at .03125. Draw the supply curve of the firm.
e) How much will this firm offer to the market and what are the profits of the firm when the price of output is $10?
f) Please give an intuitive explanation for the differences in your answers for parts c) and e).
g) For what value of Q are the short-run cost function and the long-run cost function equal?