In our analysis of the firm's investment decision, we let $\kappa(t)$ be the capital stock of a single firm and $K(t) = N \times \kappa(t)$ equal the aggregate capital stock, where the number of firms N is large enough that the firm neglects the tiny influence that its own capital has on the aggregate stock.

We model the firm's operating profit (revenue less costs other than capital adjustment costs) per unit of capital as $\pi[K(t)]$, so total operating profit is $\pi[K(t)] \times \kappa(t)$.

1. Why would operating profit per unit of capital depend on the industry's capital stock?

2. Under what circumstance would it not depend on the firm's capital stock?

3. What sign would we expect for $\pi'[K(t)]$?

4. We assume that real capital-stock adjustment costs for the firm depend on its net investment rate. We write this cost as $C[\dot{\kappa}(t)]$. What is the economic interpretation of the following conditions?

   a. $C(0) = 0$

   b. $C'(0) = 0$

   c. $C''(\dot{\kappa}) > 0$