Instructions:

There are 2 questions worth a total of 100 points. Answer each question clearly and concisely. You must show your work to receive credit. You are allowed to work with others, but all work must be your own.

Clearly print your name above and in the space provided on the next page. You must turn in both sides of this cover sheet along with your responses. You do not need to turn in the questions, only your responses with the cover sheet. All pages must be stapled to be graded.
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**Limit Pricing**

1. The inverse of market demand is \( P = 120 - 4Q \). There are two firms, an incumbent and a potential entrant, and both firms compete in quantities. The costs of each firm are \( C(q) = 20q \) and the potential entrant faces an entry cost of \( E^2 \). The interest rate is 25%. Assume that the incumbent can costlessly and credibly commit to any production level. Answer the following questions.

(a) What is the incumbent’s limit price as a function of \( E \)?

(b) What’s the level of entry cost, \( E \), such that the incumbent is indifferent to accommodating entry and using a limit pricing strategy?

(c) If the incumbent didn’t face a potential entrant, what quantity would they set and what is the discounted sum of profits?

(d) If \( E = 26 \), what is the limit priced used by the firm? (Note: this is a trick to this question.)

**Strategic Bundling**

2. There are two firms, A and B, with a constant marginal cost of $10. There are two markets, 1 and 2, with different goods. Firm A has a monopoly in market 1 so \( Q_1 = q_{1A} \), and both firms compete in quantities in the second market so \( Q_2 = q_{2A} + q_{2B} \). There is a representative consumer who’s utility maximization problem is as follows.

\[
\max_{m,Q_1,Q_2} U = m + 100Q_1 - \frac{1}{2}Q_1^2 + 100Q_2 - \frac{1}{2}Q_2^2
\]

subject to

\[
Y = p_1Q_1 + p_2Q_2 + m
\]

\( m \) is a composite good with a price normalized to 1. \( Y \) is the representative consumer’s income and \( p_1 \) and \( p_2 \) are the prices of their respective goods.

(a) Find the profits of each firm.

(b) Find the profits of each firm when firm A offers a pure bundle of \( b_A = q_{1A} + q_{2A} \). Is firm A better off?

(c) Find the profits of each firm when firm A offers a mixed bundle where firm A offers two products: \( b_A \) and \( q_{1A} \) where \( b_A = q_{1A} + q_{2A} \). (Note that firm A does not offer \( q_{2A} \) separately in this mixed bundle.) Is firm A better off with no bundling, a pure bundle or the mixed bundle?