1 Firm and Aggregate Supply

A. His average cost is smallest when \( y^{MES} = 22 \).
B. \( p = AC(22) = 11 \) to break even.
C. \( (y^{SD}, p^{SD}) = (18, 4) \), where his average variable cost is smallest.
D. Marginal condition \( MR(y) = MC(y) \) implies \( y^* = 20 \), where \( MC(20) \) coincides with the market price \( p = 7 \).
E. Short-run profit \( \hat{\pi} > 0 \). \( \hat{\pi} = py - VC(y) = y[p - AVC(y)] \). At \( y^* = 20 \), \( p = 7 \) whereas \( AVC(20) < 7 \), implying \( \hat{\pi} = y[p - AVC(y)] = 20(7 - AVC(20)) > 0 \). Similarly, long-run profit \( \pi < 0 \) because \( \pi = py - TC(y) = y[p - AC(y)] = 20(7 - AC(20)) < 0 \) because \( AC(20) > 7 \).
F. Decreases. Since long-run profit is negative, firms will exit in the long run.
G. \( p = 11 \left( = AC(y^{MES}) \right) \) in the long run. The number of bakers will decrease, tightening the supply at each exit and raising the market price. Outflow of bakers stops when the price grows high enough that existing firms break even, i.e., when the price reaches the minimum average cost. From that point on, price no longer increases. If it did, it would induce entry, cause excess supply and price would come down to $11 to clear the market.

2 Long-Run Aggregate Supply

A. Proposition 2.8 in Chapter 21 implies \( AC(y^{MES}) = MC(y^{MES}) \). In this example,
\[
AC(y) := \frac{TC(y)}{y} = \frac{y^2 + 4}{y}.
\]
Equate \( AC(y) \) to \( MC(y) = 2y \) to find
\[
\frac{y^2 + 4}{y} = 2y \Rightarrow y^2 = 4 \Rightarrow y^{MES} = 2.
\]
The smallest unit production cost is \( AC(y^{MES}) = 4 \).
B. \( y^{MES} = 2 \).
C. In the long run, \( p = AC(y^{MES}) = 4 \). If \( p > AC(y^{MES}) \), then there is long-run profit, which invites new firms to join the market and creates excess supply. Then price drops. Vice versa when \( p < AC(y^{MES}) \) so that \( p = AC(y^{MES}) \) in the long run, at which point, the number of operating bakers stabilizes.
D. When \( p = 4 \), the quantity demanded is \( 4 = \frac{-4}{100} + 8 \Rightarrow Y^* = 400 \) cheesecakes.
E. Each baker bakes \( y^{MES} = 2 \) cheesecakes so that there are \( Y^*/y^{MES} = 200 \) bakers.

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3 Monopolist’s PMP (Stepwise)

A. \( FC = TC(y = 0) = 5 \) dollars.
B. \( MC(y) = 2 \) dollars regardless of the current number of cheesecakes \( y \).
C. See Table 1.

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<th>( MC(y) )</th>
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Table 1.

D. [Optional] From \( y = 8 \) and onwards. Total revenue starts to decline at \( y = 8 \) (or equivalently, the marginal revenue turns subzero from \( y = 8 \) on) as revenue loss due to lowered price overwhelms revenue increase due to increased sales.

E. Marginal condition \( MC(y) = MR(y) \) happens at \( y^* = 6 \).

F. See Figure 1(a).

\[ p = MWTP(y^*) = 4.5. \]

I. Marginal-cost pricing \( (p = MC(y)) \) will lead to \( y = 11 \), at which point, \( \pi(y) = -5 \).
4 Monopolist’s PMP (Continuous)

See Figure 2 for your reference.

![Figure 2](image)

A. \( FC = TC(y = 0) = 5 \) dollars.
B. \( MC(y) = 2 \) regardless of the existing number \( y \) of cheesecakes produced.
C. Sam solves \( \max_y \pi(y) = py - TC(y) = (\frac{-y}{3} + 7)y - (2y + 5) \).
D. Marginal condition is \( MR(y) = MC(y) \), which leads to \( y^* = 5 \).
E. Plug \( y^* = 5 \) obtained above in \( MWTP(y) \) (not \( MR(y) \)) to find \( p = 4.5 \).
F. If he keeps baking till marginal-cost pricing scheme of a price taker \( (p = MC(y)) \) is met, he will produce \( y = 10 \) cheesecakes \( (MC(10) = 2 = MWTP(10)) \). His profit will be \( \pi(y) = 2\cdot10 - TC(10) = -5 \) dollars.