Errata file for "Intermediate Microeconomic Theory: Tools and Step-by-step Examples," MIT Press

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1. **Chapter 2.**

   - Page 13, Example 2.2, second paragraph should read "In addition, he says that there are other bundles different from A and D making him happier than D does.
   - Page 18, Example 2.5, last sentence should read "As in the case of MU_x, we find there that...".
   - Page 19, Example 2.6:
     - First sentence after the displayed equation should read "which is negative for any positive amounts of goods x and y."
     - Last sentence should read "for all positive values of x and y."
   - Page 22.
     - Line 4 should read "...than the horizontal intercept $9/5 = 1.8$ "
     - Line 7 should read "...where we have $y \simeq 1.33$."
   - Page 23.
     - Second paragraph should refer to figure 2.5 rather than 2.3b.
     - Footnote 6, line 2, should read "...an indifference curve $y = \frac{10+ax}{b} = \frac{10}{b} + \frac{a}{b}x$, which increases in..."
   - Page 37, third line should read "...she is poorer than individual 2. In contrast, when individual..."
   - Page 39, Exercise 7(a) should read "For a given utility level of 10, find the..."
   - Page 41, Exercise 15, lines 3-4 should read "Relative to envy preferences in exercise 14, guilt preferences reduce Peter's utility..."

2. **Chapter 3.**

   - Page 46, last paragraph should read "At the horizontal (vertical) intercept, the consumer spends..."
   - Page 50, previous to last sentence should read $u(x, y) = ax^2 - by$, where $a, b > 0$ and..."
   - Page 51, first sentence, immediately before Tool 3.1, should add "For simplicity, this chapter only considers utility function that produce strictly convex indifference curves (such as the Cobb-Douglas and perfect complements) or linear indifference curves (such as perfect substitutes)."
   - Page 52,
     - Step 2a, after the displayed equation should read "...which yields $\frac{100}{30} \simeq 3.33$ units."
     - Step 4: at the end should read "...tangency condition $y = x \simeq 3.33$ units."

- Page 58. Example 3.4. The last ratio, at the end of the first paragraph, should read $\frac{I'}{p'_x}$ instead of $\frac{I'}{p_x}$.
- Page 62. Example 3.5.
  - The second displayed equation should read

$$y = \left(\frac{100}{5} - \frac{4-1}{5}2\right) - \frac{1}{5}x = \left(20 - \frac{3}{5}2\right) - \frac{1}{5}x = \frac{94}{5} - \frac{1}{5}x \quad \text{for all } x > 2.$$

  - The previous-to-last line in example 3.5 should read -0.2, thus becoming flatter..."
- Page 64: At the middle of the page, equation $\frac{\partial \mathcal{L}}{\partial y}$ should read

$$\frac{\partial \mathcal{L}}{\partial y} = MU_y - \lambda p_y = 0, \text{ and}$$

- Page 67.
  - Step 2a, second line should read "from step 1, $y = x$, in the constraint..."
  - Example 3.8, second line should read "utility from example 3.3,..."
- Page 68, Step 2a, fourth line should read "...we obtain $y \simeq 1.08$ units."

3. **Chapter 4.**

- Page 81, figure 4.2b (right panel) should be have an inverted-U shape: first increasing with income, then decreasing with income.
- Page 94. Self-assessment 4.9, close to the end of the page, should read "... utility function is $u(x, y) = 3x^{1/2} + 4y$, her income is...".
- Page 96, last paragraph, second line should read "...to the decomposition bundle B, $L_B - L_A$, whereas the income effect..."
- Page 101, line 4 should read "...$\simeq -5.55$ units."
- Page 102, exercise 3(b) should read "Find the new demand function for each good."
- Page 103, exercise 8, last sentence should read "...and income effects from this price change."

4. **Chapter 6.**

- Page 132, Example 6.3: Please remove the \$ sign inside the square roots.
- Page 134, footnote 4, line 2, should read "... positive for all income levels $I > 0$."
- Page 136, footnote 6, line 2: should read "which is positive for all $I > 0$, implying that..."
- Page 136, footnote 6, line 3, should read "which is also positive for all $I > 0$, thus indicating..."
- Page 145.
  - Line 3, please remove the \$ sign inside the square roots.
  - Example 6.11. The sentence after the first displayed equation of the example should read "which simplifies to $\sqrt{\$3,000} > \frac{6}{7}\sqrt{\$4,000}$, or $54.77 > 54.21$. In addition, lottery D is preferred to C in Choice 2. Assuming that $g(x) = 2$, as in previous examples, but $g(y)$ now increases to $g(y) = 9$, we find that lottery D is preferred to C if and only if

$$\begin{aligned} & \frac{9 \times 0.2}{(9 \times 0.2) + (2 \times 0.8)}\sqrt{\$4,000} + \frac{2 \times 0.8}{(9 \times 0.2) + (2 \times 0.8)}\sqrt{\$0} \\ > \quad & \frac{9 \times 0.25}{(9 \times 0.25) + (2 \times 0.75)}\sqrt{\$3,000} + \frac{2 \times 0.75}{(9 \times 0.25) + (2 \times 0.75)}\sqrt{\$0} \end{aligned}$$

    which simplifies to $\frac{9}{17}\sqrt{\$4,000} > \frac{3}{5}\sqrt{\$3,000}$, or $33.48 > 32.86$. Therefore, the experimental observations..."

- Bottom of page 147. The displayed equation should have exponent 1/2. This also applies to the in-line equation in the subsequent paragraph (second line), which should also have exponent 1/2.

5. **Chapter 7.**

- Page 156, Example 7.1, end of second paragraph should read "...level of $1 - 0.77 = 0.23$."
- Page 170, third line, should read "...vertical line because ratio $\frac{q}{Aa}$ is not a function..."
- Page 171, immediately before the first displayed equation, should read "In addition, the slope of the isoquant..."

6. **Chapter 8.**

- Page 187. Immediately before Tool 8.1, should read "This tool applies to production functions that generate strictly convex and linear isoquants."
- In page 190, "this input demand", in the middle of the page, should read "these input demands".
- In page 191, at the bottom of the page (immediately before Self-assessment 8.5), the in-line equation should have ratio $\frac{q}{8}$ rather than $\frac{q}{2}$.
- In Example 8.7 (page 194), the in-line equation $4r < w$ should read $r < 4w$ everywhere it shows up. Similarly, the inequality $4r > w$ should read $r > 4w$ everywhere. These two changes apply to Example 8.7 and all subsequent examples in this chapter.
- In Example 8.10 (page 201), the displayed equation at the top of the page should read

$$\varepsilon_{TC,q} = \frac{\partial TC}{\partial q}\frac{q}{TC} = \frac{r}{8}\frac{q}{r\frac{q}{8}} = 1$$

The paragraph following this equation should read "which means that, if the firm seeks to produce 1 percent more units of output, its total costs increase by exactly one percent. (A similar argument applies if input prices satisfy $4r > w$, where $TC = w\frac{q}{2}$, where output elasticity also becomes $\varepsilon_{TC,q} = 1$, which we leave for the reader as an exercise.)"

7. **Chapter 9.**

- Page 224. Example 9.5. Second line in the last paragraph should read "...price of $p = \$1.32$ at $N = 61.62$ firms."
- Page 229. Second displayed equation has a missing $-$ sign, so it should read $-5+4q = \frac{5}{q} - 5 + 2q$. The remaining calculations in Example 9.4 are correct.
- Page 239, last displayed equation. Its last term should read 2×2 (as in two times two) in the denominator, rather than $2p_1$.

8. **Chapter 10.**

- Page 248.
  - Seventh line should read "implying that the total cost of a single firm producing q units is lower than that of two firms that together produce q units, that is, $TC(q) < TC(q_1)+TC(q_2)$, where $q = q_1 + q_2$.
  - Footnote 1 should read "For instance, if $TC = 100 + 2q$, the cost of producing $q = 10$ units by a single firm is $TC(10) = \$120$, whereas the aggregate cost of two firms producing 5 units each is $TC(5) + TC(5) = 110 + 110 = \$220$. A similar argument applies to firms with total cost function of the form $TC(q) = a + bq$, where $a, b > 0$, since the aggregate cost of two firms producing $\frac{q}{2}$ units each is $TC\left(\frac{q}{2}\right) + TC\left(\frac{q}{2}\right) = \left(a + b\frac{q}{2}\right) + \left(a + b\frac{q}{2}\right)$, which simplifies to $2a + bq$, which is larger than the total cost of a single firm producing q units, $TC(q) = a + bq$."
- Page 261. The second displayed equation should have $(q_1 + q_2)$ multiplied times the second term, so it should read $p(q_1, q_2) + \frac{\partial p(q_1,q_2)}{\partial q_1}(q_1 + q_2) = \frac{\partial TC_1(q_1)}{\partial q_1}$. A similar comment applies to the third displayed equation, which should read $p(q_1, q_2) + \frac{\partial p(q_1,q_2)}{\partial q_2}(q_1 + q_2) = \frac{\partial TC_2(q_2)}{\partial q_2}$.

- Page 262. Last line should read "...of $\frac{q_1}{Q} = \frac{5}{14} \simeq 0.35$ in the US plant, and the remaining $\frac{q_2}{Q} = \frac{9}{14} \simeq 0.64$ in the Chilean..."

9. **Chapter 11.**

   - Figure 11.2, in the middle of the horizontal axis, the label should read $q^{FD} = q^{PC}$.

10. **Chapter 12.**

    - Page 297, first line should add a space so it reads "...in economics, a discussion..."
    - Page 298 should read "we consider an scenario"
    - Page 299, second paragraph, second sentence, should read "...this requires that every player maximizes his utility and that he knows the rules of the game..."
    - Page 300, last paragraph should read "When strategy s_i strictly dominates every other strategy s_i', we say that..."
    - Page 301. Tool 12.1, fix the step numbering.
    - Page 307. Tool 12.2, fix the step numbering.
    - Page 316, last paragraph, should read "have a NE" rather than "have an NE" in both instances.
    - Page 320, immediately after the last displayed equation should read "...when the goalie dives left..."
    - Page 320, last paragraph should read "Do all games have a msNE with at least one player randomizing her strategies? Not necessarily..."
    - Page 321, last line of the first paragraph should read "... or a msNE)."

11. **Chapter 13.**

    - Page 336, last paragraph should read "...the smallest subgame that we can circle is the one initiated after...". The end of this paragraph should read "Circles that break firm 2's..."

12. **Chapter 14.**

    - Page 357.
      - In the first displayed equation, percentages are omitted. The equation should read

$$\begin{aligned} HHI &= \left(\frac{100}{1,000}\right)^2 + \left(\frac{100}{1,000}\right)^2 + \ldots + \left(\frac{100}{1,000}\right)^2 \\ &= 1,000\left(\frac{100}{1,000}\right)^2 = 10. \end{aligned}$$

      - Similarly, in the same page, for an industry with $N \geq 1$ firms, the second displayed equation should read

$$\begin{aligned} HHI &= \left(\frac{100}{N}\right)^2 + \left(\frac{100}{N}\right)^2 + \ldots + \left(\frac{100}{N}\right)^2 \\ &= N\left(\frac{100}{N}\right)^2 = \frac{10,000}{N}, \end{aligned}$$

    - Page 361, first displayed equation, second line. Number 2 in the numerator should be deleted.
    - Page 362.

– First displayed equation should read

$$\begin{aligned} p^* &= p\left(\frac{a-c}{3b}, \frac{a-c}{3b}\right) = a - b\left(\frac{a-c}{3b} + \frac{a-c}{3b}\right) \\ &= a - \frac{2\,(a-c)}{3b} \\ &= \frac{a+2c}{3}. \end{aligned}$$

– Last sentence immediately before example 14.1 should read "This can be alternatively expressed as $\pi_i^* = b(q^*)^2$."

- Page 366.
  - First line should read "...two firms produce a homogeneous good..."
  - Paragraph 1(a), fifth line should read "...where $\varepsilon \to 0$ indicates a small reduction..."
  - Footnote 7 should add the following sentence at the end "Generally, the small price reduction, ε, requires that $\varepsilon < p_2 - c$ to ensure that firms do not make a loss. Then, extremely small price reductions, $\varepsilon \to 0$, satisfy this requirement."
- Page 367.
  - Second line, the in-line equation should read "$p_2' = p_1 - \varepsilon$, where $\varepsilon \to 0$ is a small number..."
  - Last paragraph should read "...by a small amount, ε, so that $p_i = p - \varepsilon$, where $\varepsilon \to 0$."
- Page 368.
  - Figure 14.6, its top label should read $p - \varepsilon$, rather than $p_i - \varepsilon$.
  - Example 14.3, sixth line, should read "$Q^* = 12 - c$", rather than $Q = 12 - c$.
- Page 370.
  - Last displayed equation should not have star symbol, so it starts with "$\pi_i =$".
  - The last sentence of example 14.4 should read "...were only $\pi_i^* = \frac{64}{9} \simeq \$7.11$."
- Page 373. Self-assessment 14.6, second line should read "...during each of the two periods before the..."
- Page 374. Second displayed equation should read $a - bq_1 - 2q_2 - c = 0$.
- Page 376.
  - Example 14.7 should be numbered Example 14.6.
  - The last paragraph of this example should read "...for the leader, $q_1^* = 4$ units, which entails $q_2^* = \frac{4}{2} = 2$ units for the follower. In this scenario,..."
- Page 378, last line should read "...in equilibrium output, $q_i^* = q_j^* = q^*$, which yields..."
- Page 379. Example 14.8 should be numbered Example 14.7.
- Page 380, last paragraph before the last displayed equation should read "Rearranging this, we find $c - c - bQ_{-i} = 2bq_i$.
- Page 382, Duopoly section, paragraph after the displayed equation should read "...and equilibrium price becomes $p^* = \frac{a+2c}{2+1} = \frac{a+2c}{3}$, which also..."
- Page 386. Exercise 13, fourth line should read "...during each of thre three periods before the..."

13. **Chapter 15.**

- Page 395, previous to last paragraph should read "...are parallel to each other, but $q_2^L(q_1)$ originates at..."
- Page 397, last paragraph should read "...yields an expected profit equal to..."
- Page 399, point 3(c), first line should read "If the highest competing bid h_i lies above b_i (see case 3c in figure 15.2), bidder i loses, earning a zero payoff."

14. **Chapter 16.**

- Page 423, fourth line should read "...high effort become..."
- Page 424, previous to last paragraph should read "...the positive effects offset..."
- Page 430.
  - Second line should read "if $\frac{3}{4} - p \geqslant 0$, or $p \leqslant \frac{3}{4}$. In this scenario, the seller's..."
  - The second expression in the second displayed equation, PC, should read "subject to $p \leqslant \frac{3}{4}$."
- Page 432, fourth line should read "$w = \theta e^2$. Inserting this result..."
- Page 436, last paragraph should read "...with low cost of effort because $e_L^{SI} = e_L^{AI} = \frac{1}{\sqrt{2}}$. This is often..."
- Page 439. Line 5 should read "...to the uninformed firm. As discussed..."
- Page 440. Delete the number 1 in the paragraph after the last displayed equation.

15. **Chapter 17.**

- Page 448. Example 17.2. Line 14 should read "Differenting with respect to q yields $(10 - 2q - 2) - 6\alpha^2 q = 0$, which simplifies to $8 = 2(q + 6\alpha^2)$. Solving for output q, we obtain that the social optimum is
$$q^{SO} = \frac{8}{2 + 6\alpha^2},$$
- Page 449.
  - The label at the bottom of figure 17.2 should read $q^{SO} = \frac{8}{2+6\alpha^2}$.
  - First line should read "whereas $\frac{\partial EC}{\partial q} = 6\alpha^2 q$ is a straight line starting from the origin and growing at a rate of $6\alpha^2$."
  - Line 4 should read "...crosses marginal damage, at $q^{SO} = \frac{8}{2+6\alpha^2}$."
  - Line 9 should read "...the socially optimal output $q^{SO} = \frac{8}{2+6\alpha^2}$ decreases in..."
  - Line 12 should read "...the socially optimal output becomes $\frac{8}{2+6(100)^2} = \frac{8}{2+6(100)^2} \simeq 0.0001$ units."
- Page 450. Example 17.3.
  - Line 3 should read "...the external cost in example 17.2. In addition, assume that α satisfies $0 \leqslant \alpha \leqslant 2$. The social planner's problem is..."
  - Line 5 should read "Differentiating with respect to q yields $(10 - 2q - 2) - (6\alpha^2 q + 7\alpha) = 0$, which simplifies to $8 - 7\alpha = q(2 + 6\alpha^2)$. Solving for output q, we obtian that the social optimum is
$$q^{SO} = \frac{8 - 7\alpha}{2 + 6\alpha^2}.$$
  - Last displayed equation should read
$$\begin{aligned} \frac{\partial q^{SO}}{\partial \alpha} &= \frac{-7\left(2 + 6\alpha^2\right) - 12\alpha(8 - 7\alpha)}{\left(2 + 6\alpha^2\right)^2} \\ &= \frac{-7 + 3\alpha\left(7\alpha - 16\right)}{\left(2 + 6\alpha^2\right)^2}, \end{aligned}$$
    which is negative for all $\alpha < 2.42$, which holds given that α satisfies $0 \leqslant \alpha \leqslant 2$ by assumption.[1] "
  - Line 12 should read "... if α is large enough. In particular, $\frac{8-7\alpha}{2+6\alpha^2} \leqslant 0$, so long as..."
- Page 448. Renumber all examples, starting at Example 17.3, which should read Example 17.2.
- Page 453, section 17.3.2, fourth line should read "...or emission fees, which increase the cost..."
- Page 464, exercise 17.6, second line should read "...for $\alpha \in \left[0, \frac{1}{3}\right]$. Which subsidy per unit..."

[1] To see this point, note that the denominator of the above expression, $\left(2 + 6\alpha^2\right)^2$, is unambiguously positive, and the numerator is negative if and only if $3\alpha\left(7\alpha - 16\right) - 7 < 0$ or, alternatively, $21\alpha^2 - 16\alpha - 7 < 0$. Solving for α, we obtain two roots: $\alpha < 2.42$ and $\alpha > -0.13$. Since parameter α satisfies $\alpha \geq 0$ by assumption, the only relevant root is $\alpha < 2.42$.