

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

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

- 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 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.
- 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.

## 7. Chapter 9.

- 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  $2 \times 2$  (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  $TC(\frac{q}{2}) + TC(\frac{q}{2}) = (a + b\frac{q}{2}) + (a + b\frac{q}{2})$ , 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  $p(q_1, q_2) + \frac{\partial p(q_1, q_2)}{\partial q_2}(q_1 + q_2) = \frac{\partial TC_2(q_2)}{\partial q_2}$ .

## 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

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

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

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

- 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  $\varepsilon \rightarrow 0$  indicates a small reduction..."

– Footnote 7 should add the following sentence at the end "Generally, the small price reduction,  $\varepsilon$ , requires that  $\varepsilon < p_2 - c$  to ensure that firms do not make a loss. Then, extremely small price reductions,  $\varepsilon \rightarrow 0$ , satisfy this requirement."

- Page 367.

– Second line, the in-line equation should read " $p'_2 = p_1 - \varepsilon$ , where  $\varepsilon \rightarrow 0$  is a small number..."

– Last paragraph should read "...by a small amount,  $\varepsilon$ , so that  $p_i = p - \varepsilon$ , where  $\varepsilon \rightarrow 0$ ."

- 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 three 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  $\frac{3}{4} - p \geq 0$ , or  $p \leq \frac{3}{4}$ . In this scenario, the seller's..."
  - The second expression in the second displayed equation, PC, should read "subject to  $p \leq \frac{3}{4}$ ."
- 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 "Differentiating with respect to  $q$  yields  $(10 - 2q - 2) - 6\alpha^2q = 0$ , 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  $\frac{\partial EC}{\partial q} = 6\alpha^2q$  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  $\alpha$  satisfies  $0 \leq \alpha \leq 2$ . 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 obtain that the social optimum is

$$q^{SO} = \frac{8 - 7\alpha}{2 + 6\alpha^2}.$$

- Last displayed equation should read

$$\begin{aligned} \frac{\partial q^{SO}}{\partial \alpha} &= \frac{-7(2 + 6\alpha^2) - 12\alpha(8 - 7\alpha)}{(2 + 6\alpha^2)^2} \\ &= \frac{-7 + 3\alpha(7\alpha - 16)}{(2 + 6\alpha^2)^2}, \end{aligned}$$

which is negative for all  $\alpha < 2.42$ , which holds given that  $\alpha$  satisfies  $0 \leq \alpha \leq 2$  by assumption.<sup>1</sup>

- Line 12 should read "... if  $\alpha$  is large enough. In particular,  $\frac{8-7\alpha}{2+6\alpha^2} \leq 0$ , 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  $\alpha \in [0, \frac{1}{3}]$ . Which subsidy per unit..."

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