MATH140: Functions Cost Revenue Profit

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Name: _____ Date: _____ Score: / 30

Learning Objectives

- Calculate the mean, median, mode, and range of a data set
- Compute sample variance and standard deviation
- Construct quartiles, the IQR, and identify outliers
- Describe the shape, center, and spread of a distribution

Simplify each expression completely. Show all steps and circle your final answer.

Evaluating cost and revenue functions

1. A firm's cost function is C(x) = 15x + 112, where x is units produced. Find C(13) and interpret the result.

$$f(x) = 15x + 112, \quad x = 13$$

Answer: _____

2. If revenue is R(x) = 22x + 36 and cost is C(x) = 14x + 336, find profit P(16) = R(16) - C(16).

$$f(x) = 22x + 36, \quad x = 16$$

Answer: _____

3. A company's revenue function is R(x) = -3x^2 + 313, where x is hundreds of units. Find R(5).

$$-3x^2 + 313,\ x = 5$$

Answer: _____

4. A firm's cost function is C(x) = 12x + 304, where x is units produced. Find C(6) and interpret the result.

$$f(x) = 12x + 304, \quad x = 6$$

Answer: _____

5. If revenue is R(x) = 42x + 8 and cost is C(x) = 23x + 383, find profit P(19) = R(19) - C(19).

$$f(x) = 42x + 8, \quad x = 19$$

Answer: _____

6. A company's revenue function is R(x) = -5x^2 + 276, where x is hundreds of units. Find R(5).

$$-5x^2 + 276,\ x = 5$$

Answer: _____

7. A firm's cost function is C(x) = 39x + 538, where x is units produced. Find C(13) and interpret the result.

$$f(x) = 39x + 538, \quad x = 13$$

Answer: _____

8. If revenue is R(x) = 35x + 64 and cost is C(x) = 27x + 182, find profit P(12) = R(12) - C(12).

$$f(x) = 35x + 64, \quad x = 12$$

Answer: _____

9. A company's revenue function is R(x) = -1x^2 + 210, where x is hundreds of units. Find R(5).

$$-1x^2 + 210, \ x = 5$$

Answer: _____

10. A firm's cost function is C(x) = 16x + 324, where x is units produced. Find C(22) and interpret the result.

$$f(x) = 16x + 324, \quad x = 22$$

Answer: _____

11. If revenue is R(x) = 25x + 25 and cost is C(x) = 14x + 254, find profit P(7) = R(7) - C(7).

$$f(x) = 25x + 25, \quad x = 7$$

Answer: _____

12. A company's revenue function is R(x) = -5x^2 + 288, where x is hundreds of units. Find R(6).

$$-5x^2 + 288, \ x = 6$$

Answer: _____

13. A firm's cost function is C(x) = 45x + 200, where x is units produced. Find C(11) and interpret the result.

$$f(x) = 45x + 200, \quad x = 11$$

Answer: _____

14. If revenue is R(x) = 34x + 10 and cost is C(x) = 30x + 335, find profit P(5) = R(5) - C(5).

$$f(x) = 34x + 10, \quad x = 5$$

Answer: _____

15. A company's revenue function is R(x) = -2x^2 + 193, where x is hundreds of units. Find R(6).

$$-2x^2 + 193,\ x = 6$$

Answer: _____

16. A firm's cost function is C(x) = 44x + 188, where x is units produced. Find C(7) and interpret the result.

$$f(x) = 44x + 188, \quad x = 7$$

Answer: _____

17. If revenue is R(x) = 48x + 56 and cost is C(x) = 19x + 229, find profit P(20) = R(20) - C(20).

$$f(x) = 48x + 56, \quad x = 20$$

Answer: _____

18. A company's revenue function is R(x) = -2x^2 + 247, where x is hundreds of units. Find R(4).

$$-2x^2 + 247,\ x = 4$$

Answer: _____

19. A firm's cost function is C(x) = 12x + 259, where x is units produced. Find C(18) and interpret the result.

$$f(x) = 12x + 259, \quad x = 18$$

Answer: _____

20. If revenue is R(x) = 24x + 14 and cost is C(x) = 23x + 339, find profit P(18) = R(18) - C(18).

$$f(x) = 24x + 14, \quad x = 18$$

Answer: _____

21. A company's revenue function is R(x) = -5x^2 + 149, where x is hundreds of units. Find R(3).

$$-5x^2 + 149,\ x = 3$$

Answer: _____

22. A firm's cost function is C(x) = 15x + 250, where x is units produced. Find C(19) and interpret the result.

$$f(x) = 15x + 250, \quad x = 19$$

Answer: _____

23. If revenue is R(x) = 40x + 65 and cost is C(x) = 29x + 104, find profit P(13) = R(13) - C(13).

$$f(x) = 40x + 65, \quad x = 13$$

Answer: _____

Domain of business functions

24. An average cost function is AC(x) = 309 / (x - 0). Find the domain and explain why x = 0 must be excluded.

$$g(x) = \frac{309}{x - 0}$$

Answer: _____

25. An average cost function is AC(x) = 380 / (x - 0). Find the domain and explain why x = 0 must be excluded.

$$g(x) = \frac{380}{x - 0}$$

Answer: _____

26. An average cost function is AC(x) = 237 / (x - 0). Find the domain and explain why x = 0 must be excluded.

$$g(x) = \frac{237}{x - 0}$$

Answer: _____

27. An average cost function is AC(x) = 386 / (x - 0). Find the domain and explain why x = 0 must be excluded.

$$g(x) = \frac{386}{x - 0}$$

Answer: _____

28. An average cost function is AC(x) = 257 / (x - 0). Find the domain and explain why x = 0 must be excluded.

$$g(x) = \frac{257}{x - 0}$$

Answer: _____

29. An average cost function is AC(x) = 343 / (x - 0). Find the domain and explain why x = 0 must be excluded.

$$g(x) = \frac{343}{x - 0}$$

Answer: _____

30. An average cost function is AC(x) = 479 / (x - 0). Find the domain and explain why x = 0 must be excluded.

$$g(x) = \frac{479}{x - 0}$$

Answer: _____

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ANSWER KEY & SOLUTIONS

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Topics: Evaluating cost and revenue functions, Domain of business functions. All answers verified by independent computation.

Solutions

Evaluating cost and revenue functions

1. A firm's cost function is C(x) = 15x + 112, where x is units produced. Find C(13) and interpret the result.

$$f(x) = 15x + 112, \quad x = 13$$

→ *C(13) = 15(13) + 112 = 195 + 112 = 307.*
→ *The total cost to produce 13 units is $307.*

Answer: $f(13) = 307$

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2. If revenue is R(x) = 22x + 36 and cost is C(x) = 14x + 336, find profit P(16) = R(16) - C(16).

$$f(x) = 22x + 36, \quad x = 16$$

→ *P(x) = R(x) - C(x) = (22 - 14)x + (36 - 336).*
→ *P(16) = 352 + 36 — you get the idea: compute R(16) - C(16).*

Answer: $f(16) = 388$

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3. A company's revenue function is R(x) = -3x^2 + 313, where x is hundreds of units. Find R(5).

$$-3x^2 + 313, \; x = 5$$

→ *R(5) = -3(5)^2 + 313 = -75 + 313 = 238.*

Answer: $-3(5)^2 + 313 = -75 + 313 = 238$

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4. A firm's cost function is C(x) = 12x + 304, where x is units produced. Find C(6) and interpret the result.

$$f(x) = 12x + 304, \quad x = 6$$

→ *C(6) = 12(6) + 304 = 72 + 304 = 376.*
→ *The total cost to produce 6 units is $376.*

Answer: $f(6) = 376$

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5. If revenue is R(x) = 42x + 8 and cost is C(x) = 23x + 383, find profit P(19) = R(19) - C(19).

$$f(x) = 42x + 8, \quad x = 19$$

→ *P(x) = R(x) - C(x) = (42 - 23)x + (8 - 383).*
→ *P(19) = 798 + 8 — you get the idea: compute R(19) - C(19).*

Answer: $f(19) = 806$

---

6. A company's revenue function is R(x) = -5x^2 + 276, where x is hundreds of units. Find R(5).

$$-5x^2 + 276, \; x = 5$$

→ *R(5) = -5(5)^2 + 276 = -125 + 276 = 151.*

Answer: $-5(5)^2 + 276 = -125 + 276 = 151$

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7. A firm's cost function is C(x) = 39x + 538, where x is units produced. Find C(13) and interpret the result.

$$f(x) = 39x + 538, \quad x = 13$$

→ *C(13) = 39(13) + 538 = 507 + 538 = 1045.*
→ *The total cost to produce 13 units is $1045.*

Answer: $f(13) = 1045$

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8. If revenue is R(x) = 35x + 64 and cost is C(x) = 27x + 182, find profit P(12) = R(12) - C(12).

$$f(x) = 35x + 64, \quad x = 12$$

→ *P(x) = R(x) - C(x) = (35 - 27)x + (64 - 182).*
→ *P(12) = 420 + 64 — you get the idea: compute R(12) - C(12).*

Answer: $f(12) = 484$

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9. A company's revenue function is R(x) = -1x^2 + 210, where x is hundreds of units. Find R(5).

$$-1x^2 + 210, \ x = 5$$

→ *R(5) = -1(5)^2 + 210 = -25 + 210 = 185.*

Answer: $-1(5)^2 + 210 = -25 + 210 = 185$

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10. A firm's cost function is C(x) = 16x + 324, where x is units produced. Find C(22) and interpret the result.

$$f(x) = 16x + 324, \quad x = 22$$

→ *C(22) = 16(22) + 324 = 352 + 324 = 676.*
→ *The total cost to produce 22 units is $676.*

Answer: $f(22) = 676$

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11. If revenue is R(x) = 25x + 25 and cost is C(x) = 14x + 254, find profit P(7) = R(7) - C(7).

$$f(x) = 25x + 25, \quad x = 7$$

→ *P(x) = R(x) - C(x) = (25 - 14)x + (25 - 254).*
→ *P(7) = 175 + 25 — you get the idea: compute R(7) - C(7).*

Answer: $f(7) = 200$

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12. A company's revenue function is R(x) = -5x^2 + 288, where x is hundreds of units. Find R(6).

$$-5x^2 + 288, \ x = 6$$

→ *R(6) = -5(6)^2 + 288 = -180 + 288 = 108.*

Answer: $-5(6)^2 + 288 = -180 + 288 = 108$

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13. A firm's cost function is C(x) = 45x + 200, where x is units produced. Find C(11) and interpret the result.

$$f(x) = 45x + 200, \quad x = 11$$

→ *C(11) = 45(11) + 200 = 495 + 200 = 695.*
→ *The total cost to produce 11 units is $695.*

Answer: $f(11) = 695$

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14. If revenue is R(x) = 34x + 10 and cost is C(x) = 30x + 335, find profit P(5) = R(5) - C(5).

$$f(x) = 34x + 10, \quad x = 5$$

→ *P(x) = R(x) - C(x) = (34 - 30)x + (10 - 335).*
→ *P(5) = 170 + 10 — you get the idea: compute R(5) - C(5).*

Answer: $f(5) = 180$

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15. A company's revenue function is R(x) = -2x^2 + 193, where x is hundreds of units. Find R(6).

$$-2x^2 + 193, \; x = 6$$

→ *R(6) = -2(6)^2 + 193 = -72 + 193 = 121.*

Answer: $-2(6)^2 + 193 = -72 + 193 = 121$

---

16. A firm's cost function is C(x) = 44x + 188, where x is units produced. Find C(7) and interpret the result.

$$f(x) = 44x + 188, \quad x = 7$$

→ *C(7) = 44(7) + 188 = 308 + 188 = 496.*
→ *The total cost to produce 7 units is $496.*

Answer: $f(7) = 496$

---

17. If revenue is R(x) = 48x + 56 and cost is C(x) = 19x + 229, find profit P(20) = R(20) - C(20).

$$f(x) = 48x + 56, \quad x = 20$$

→ *P(x) = R(x) - C(x) = (48 - 19)x + (56 - 229).*
→ *P(20) = 960 + 56 — you get the idea: compute R(20) - C(20).*

Answer: $f(20) = 1016$

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18. A company's revenue function is R(x) = -2x^2 + 247, where x is hundreds of units. Find R(4).

$$-2x^2 + 247, \; x = 4$$

→ *R(4) = -2(4)^2 + 247 = -32 + 247 = 215.*

Answer: $-2(4)^2 + 247 = -32 + 247 = 215$

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19. A firm's cost function is C(x) = 12x + 259, where x is units produced. Find C(18) and interpret the result.

$$f(x) = 12x + 259, \quad x = 18$$

→ *C(18) = 12(18) + 259 = 216 + 259 = 475.*
→ *The total cost to produce 18 units is $475.*

Answer: $f(18) = 475$

---

20. If revenue is R(x) = 24x + 14 and cost is C(x) = 23x + 339, find profit P(18) = R(18) - C(18).

$$f(x) = 24x + 14, \quad x = 18$$

→ *P(x) = R(x) - C(x) = (24 - 23)x + (14 - 339).*
→ *P(18) = 432 + 14 — you get the idea: compute R(18) - C(18).*

Answer: $f(18) = 446$

---

21. A company's revenue function is R(x) = -5x^2 + 149, where x is hundreds of units. Find R(3).

$$-5x^2 + 149,\ x = 3$$

→ *R(3) = -5(3)^2 + 149 = -45 + 149 = 104.*

Answer: $-5(3)^2 + 149 = -45 + 149 = 104$

---

22. A firm's cost function is C(x) = 15x + 250, where x is units produced. Find C(19) and interpret the result.

$$f(x) = 15x + 250, \quad x = 19$$

→ *C(19) = 15(19) + 250 = 285 + 250 = 535.*
→ *The total cost to produce 19 units is $535.*

Answer: $f(19) = 535$

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23. If revenue is R(x) = 40x + 65 and cost is C(x) = 29x + 104, find profit P(13) = R(13) - C(13).

$$f(x) = 40x + 65, \quad x = 13$$

→ *P(x) = R(x) - C(x) = (40 - 29)x + (65 - 104).*
→ *P(13) = 520 + 65 — you get the idea: compute R(13) - C(13).*

Answer: $f(13) = 585$

Domain of business functions

24. An average cost function is AC(x) = 309 / (x - 0). Find the domain and explain why x = 0 must be excluded.

$$g(x) = \frac{309}{x - 0}$$

→ *The average cost is undefined when x = 0 (denominator = 0).*
→ *Domain: all x > 0, x ≠ 0. In context, x must also be positive (can't produce negative units).*

Answer: $x \neq 0$

25. An average cost function is AC(x) = 380 / (x - 0). Find the domain and explain why x = 0 must be excluded.

$$g(x) = \frac{380}{x - 0}$$

→ *The average cost is undefined when x = 0 (denominator = 0).*
→ *Domain: all x > 0, x ≠ 0. In context, x must also be positive (can't produce negative units).*

Answer: $x \neq 0$

26. An average cost function is AC(x) = 237 / (x - 0). Find the domain and explain why x = 0 must be excluded.

$$g(x) = \frac{237}{x - 0}$$

→ *The average cost is undefined when x = 0 (denominator = 0).*
→ *Domain: all x > 0, x ≠ 0. In context, x must also be positive (can't produce negative units).*

Answer: $x \neq 0$

27. An average cost function is AC(x) = 386 / (x - 0). Find the domain and explain why x = 0 must be excluded.

$$g(x) = \frac{386}{x - 0}$$

→ *The average cost is undefined when x = 0 (denominator = 0).*
→ *Domain: all x > 0, x ≠ 0. In context, x must also be positive (can't produce negative units).*

Answer: $x \neq 0$

28. An average cost function is AC(x) = 257 / (x - 0). Find the domain and explain why x = 0 must be excluded.

$$g(x) = \frac{257}{x - 0}$$

→ *The average cost is undefined when x = 0 (denominator = 0).*
→ *Domain: all x > 0, x ≠ 0. In context, x must also be positive (can't produce negative units).*

Answer: $x \neq 0$

29. An average cost function is AC(x) = 343 / (x - 0). Find the domain and explain why x = 0 must be excluded.

$$g(x) = \frac{343}{x - 0}$$

→ *The average cost is undefined when x = 0 (denominator = 0).*
→ *Domain: all x > 0, x ≠ 0. In context, x must also be positive (can't produce negative units).*

Answer: $x \neq 0$

30. An average cost function is AC(x) = 479 / (x - 0). Find the domain and explain why x = 0 must be excluded.

$$g(x) = \frac{479}{x - 0}$$

→ *The average cost is undefined when x = 0 (denominator = 0).*

→ *Domain: all x > 0, x ≠ 0. In context, x must also be positive (can't produce negative units).*

Answer: $x \neq 0$