

Brett Robbins Academic Consulting

Mathematics 20-1 Practice Test

Unit 7: Systems of Equations and Inequalities

25 Questions

Original practice questions written to the Alberta curriculum, in the style of past diploma examinations. Work through each question, then check your answers with the key at the end.

This practice test was made by AI and there may be mistakes. If a question or answer looks wrong, contact Brett for clarification.

Question 1

The number of points of intersection of the graphs of $y = x + 1$ and $y = x^2 - 3$ is

- A) 0
- B) 1
- C) 2
- D) 3

Question 2

The solution to the system $y = x + 2$ and $y = x^2 - 4x + 2$ is

- A) (0, 2) only
- B) (0, 2) and (5, 7)
- C) (2, 0) and (7, 5)
- D) there is no solution

Question 3

The line $y = 2x + 1$ is tangent to the parabola $y = x^2 - 2x + 5$,
so the system has exactly one solution. The y -coordinate of the point of tangency is

Question 4

A point that belongs to the solution region of the system $y > x - 1$ and $y \leq 2x + 3$ is

- A) (0, 0)
- B) (-2, -4)
- C) (2, 8)
- D) (5, 3)

Question 5

The number of real solutions to the system $y = x^2 + 3$ and $y = 2x + 1$ is

- A) 2
- B) 1
- C) 3
- D) 0

Question 6

The solution to the system $y = x^2 - 1$ and $y = -x^2 + 7$ is

- A) (2, 3) only
- B) (-2, -3) and (2, 3)
- C) (-2, 3) and (2, 3)
- D) there is no real solution

Question 7

The height, h , of a ball in metres after t seconds is given by $h = -5t^2 + 30t$.

The later time, in seconds, at which the ball is 25 m above the ground is

Question 8

The constraints of a feasible region are $x \geq 0$, $y \geq 0$, $y \leq -x + 6$, and $y \geq x - 4$.

A point that does NOT belong to the feasible region is

- A) (0, 0)
- B) (5, 2)
- C) (3, 3)
- D) (1, 4)

Question 9

A company models its revenue by $R(x) = -x^2 + 50x$ and its costs by $C(x) = 10x + 400$, where x is the number of items sold. The graphs of the two models intersect at exactly one point.

The number of items sold at this break – even point is

- A) 10
- B) 30
- C) 20
- D) 40

Question 10

Two numbers have a sum of 14 and a product of 45.

The larger of the two numbers is

Question 11

The solution to the system $y = x^2 - 4x + 3$ and $y = -x^2 + 2x + 11$ is

- A) $(-1, 8)$ and $(4, 3)$
- B) $(1, 8)$ and $(4, 3)$
- C) $(-1, 3)$ and $(4, 8)$
- D) $(0, 3)$ and $(0, 8)$

Question 12

The system $y = x^2 - 4x + k$ and $y = x$ has exactly one solution when the value of k is

- A) 5
- B) 6.25
- C) 12.5
- D) 25

Question 13

The graphs of $y = x^2 + 2x - 3$ and $y = -x^2 + 4x + 9$ intersect at two points.

The product of the y -coordinates of the two points of intersection is

Question 14

The solution region of the system $y > x^2 - 4$ and $y \leq -x + 2$ is the set of points that lie

- A) below the parabola $y = x^2 - 4$
and above the line $y = -x + 2$
- B) above the parabola $y = x^2 - 4$
and strictly below the line $y = -x + 2$
- C) below the parabola $y = x^2 - 4$
and on or below the line $y = -x + 2$
- D) above the parabola $y = x^2 - 4$
and on or below the line $y = -x + 2$

Question 15

The height, h , of a football in metres after t seconds is given by $h(t) = -5t^2 + 25t + 2$.

The ball is at a height of 22 m

- A) at 1 s only
- B) at 4 s only
- C) at 1 s and 4 s
- D) at 2 s and 5 s

Question 16

The smaller x -coordinate of the points of intersection of $y = x^2 - 9x + 20$ and $y = x - 4$ is

- A) 6
- B) 4
- C) 2
- D) 10

Question 17

The system $y = 2x^2 + 3x + 5$ and $y = 2x^2 - x + 1$ has

- A) no solution
- B) exactly one solution, $(-1, 4)$
- C) exactly two solutions
- D) infinitely many solutions

Question 18

A feasible region is bounded by $x \geq 0$, $y \geq 0$, $x + y \leq 8$, and $2x + y \leq 12$.

A vertex of the feasible region is

- A) (4, 4)
- B) (5, 4)
- C) (2, 7)
- D) (6, 2)

Question 19

The length of a rectangle is 3 cm more than its width, and the area of the rectangle is 70 cm^2 .

The length of the rectangle, in centimetres, is

Question 20

Let $f(x) = x^2 - 4x + 3$ and $g(x) = -x + 3$. The values of x for which $f(x) > g(x)$ are

- A) $0 < x < 3$
- B) x greater than 3 only
- C) all real values of x
- D) $x < 0$ or $x > 3$

Question 21

A point that belongs to the solution region of the system $y \geq x^2 - 2x - 3$
and $y < 3x + 1$ is

- | | |
|------------|------------|
| A) (0, 0) | B) (1, 5) |
| C) (-1, 2) | D) (3, 12) |

Question 22

The system $y = x^2 - 4x + 7$ and $y = -x^2 + 4x - 1$ has exactly one solution.

The y -coordinate of this solution is

Question 23

A company models its revenue by $R(x) = -x^2 + 60x$ and its costs by $C(x) = 300 + 20x$,
where x is the number of items sold. The company breaks even when x equals

- | | |
|------------|-------------|
| A) 20 only | B) 10 only |
| C) 30 only | D) 10 or 30 |

Question 24

The line $y = 3x + k$ is tangent to the parabola $y = x^2 - 2x + 3$. The value of k is

A) -3.25

B) 3.25

C) -13

D) 13

Question 25

A projectile has height, h , in metres after t seconds, given by $h = -5t^2 + 40t$.

The projectile is 75 m above the ground at two different times.

The product of these two times, in seconds, is

Answer Key

- | | | |
|------|---------|--------|
| 1. C | 10. 9 | 19. 10 |
| 2. B | 11. A | 20. D |
| 3. 5 | 12. B | 21. A |
| 4. A | 13. -36 | 22. 3 |
| 5. D | 14. D | 23. D |
| 6. C | 15. C | 24. A |
| 7. 5 | 16. B | 25. 15 |
| 8. B | 17. B | |
| 9. C | 18. A | |

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