

GRE Mathematics Practice Test 35

Standard-Level Target

English edition / 66 multiple-choice questions

66

Questions

170

Minutes

A–E

One correct choice

Instructions

Choose exactly one answer for each question. Do not use a calculator. Begin timing at Question 1. Use the space provided or separate scratch paper. The answer key follows Question 66; no solutions are included.

Angles are measured in radians. Unless specified otherwise, logarithms are natural, $\mathbb{N} = \{1, 2, 3, \dots\}$, and distances in $\mathbb{R}^n$ are Euclidean. I_n denotes the $n \times n$ identity matrix. Graphs are finite and simple unless stated otherwise.

Difficulty target

A mixed standard-level target, intended to approximate public GRE Mathematics practice in scope and overall demand. This is cycle 6 of 19, position 5 of 5; difficulty decreases within each cycle.

Difficulty labels are editorial targets, not ETS-equated ratings. No official scaled-score conversion is provided.

Coverage

Calculus / 33	Differential and integral calculus, sequences and series, several variables, vector calculus, and differential equations.
Algebra / 17	Elementary and linear algebra, groups, rings, fields, and number theory.
Additional / 16	Probability, statistics, analysis, topology, complex variables, discrete mathematics, and numerical methods.

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This series uses independently written question families and parameter variants. Related mathematical structures recur across forms; these are training forms, not 95 psychometrically independent official exams.

Scope reference: ETS, *GRE Mathematics Test Practice Book*, ETS official practice-book PDF. Questions are not taken from that book. This booklet is not published or endorsed by ETS.

Questions 1–3

1. Evaluate $\iiint_{x^2+y^2+z^2 \leq 7} (x^2 + y^2 + z^2)^1 dV$.

(A) $\frac{1}{3} \left(\frac{4\pi 7^{\frac{5}{2}}}{5} \right)$

(B) $\frac{4\pi 7^{\frac{5}{2}}}{5}$

(C) $\frac{1}{2} \left(\frac{4\pi 7^{\frac{5}{2}}}{5} \right)$

(D) $\frac{5}{21} \left(\frac{4\pi 7^{\frac{5}{2}}}{5} \right)$

(E) $5 \left(\frac{4\pi 7^{\frac{5}{2}}}{5} \right)$

2. Positive real numbers x, y satisfy $\log_2 x + \log_2 y = \log_2 124$ and $x + y = 35$. Find xy .

(A) 126

(B) 123

(C) 122

(D) 124

(E) 125

3. Let $f(x, y) = e^{7x+2y}$. Find $\partial^2 f / \partial x^1 \partial y$ at $(0, 0)$.

(A) $\frac{7}{2} (2 \cdot 7^1)$

(B) $\frac{2}{7} (2 \cdot 7^1)$

(C) $2 \cdot 7^1$

(D) $\frac{1}{2} (2 \cdot 7^1)$

(E) $2 (2 \cdot 7^1)$

Questions 4–6

4. Let $X_1, \dots, X_{17}$ be independent uniform random variables on $[0, 1]$. What is $E[\max_i X_i]$?

- (A) $\frac{17}{36}$
- (B) $\frac{35}{36}$
- (C) $\frac{17}{54}$
- (D) $\frac{17}{18}$
- (E) $\frac{1}{18}$

5. Evaluate $\int_C (2x + 7y) dx + (7x + 2y) dy$, where C is the line segment from $(0, 0)$ to $(6, 1)$.

- (A) -79
- (B) 79
- (C) 158
- (D) 80
- (E) $\frac{79}{2}$

6. A sequence satisfies $u_0 = 31$ and $u_{k+1} = 1u_k + 4$ for all $k \geq 0$. Find u_5 .

- (A) 52
- (B) 49
- (C) 53
- (D) 50
- (E) 51

Questions 7–9

7. Evaluate $\int_0^1 x^6(\log x)^1 dx$.

- (A) $\frac{(-1)^1 1!}{7^2}$
- (B) $7 \left(\frac{(-1)^1 1!}{7^2} \right)$
- (C) $2 \left(\frac{(-1)^1 1!}{7^2} \right)$
- (D) $\frac{1}{2} \left(\frac{(-1)^1 1!}{7^2} \right)$
- (E) $-\frac{(-1)^1 1!}{7^2}$

8. Independent trials have success probability $1/17$. Let T count trials up to and including the first success. Find $E[T]$.

- (A) 27
- (B) 7
- (C) 12
- (D) 22
- (E) 17

9. For $x > 0$, $xy' = 7y$ and $y(1) = 1$. Find $y(e^2)$.

- (A) $1 + e^{14}$
- (B) e^{14}
- (C) $2e^{14}$
- (D) $\frac{e^{14}}{2}$
- (E) $-e^{14}$

Questions 10–12

10. A linear map $T : \mathbb{R}^{38} \rightarrow \mathbb{R}^{40}$ has rank 5. What is its nullity?
- (A) 31
(B) 35
(C) 32
(D) 33
(E) 34
11. If $y' = 7y$, $y(0) = 1$, what is the coefficient of x^2 in the Maclaurin series of y ?
- (A) $\frac{49}{2}$
(B) $\frac{49}{4}$
(C) 49
(D) $\frac{51}{2}$
(E) $-\frac{49}{2}$
12. A uniformly random subset of 17 objects is selected from a collection with 18 red and 19 blue objects. If X is the number of red objects selected, find $E[X]$.
- (A) $\frac{612}{37}$
(B) $\frac{343}{37}$
(C) $\frac{153}{37}$
(D) $\frac{380}{37}$
(E) $\frac{306}{37}$

Questions 13–15

13. A lamina occupies $0 \leq x \leq 1$, $0 \leq y \leq 7x$ and has density $\rho(x, y) = 1$. Find its centroid coordinate $\bar{x}$.

- (A) $\frac{2}{3}$
- (B) $-\frac{2}{3}$
- (C) $\frac{1}{3}$
- (D) $\frac{4}{3}$
- (E) $\frac{5}{3}$

14. What is the dimension of the real vector space of 37×37 symmetric matrices?

- (A) 703
- (B) 702
- (C) 705
- (D) 701
- (E) 704

15. Two solutions of $y'' + 7x^1y' + 2y = 0$ have Wronskian $W(0) = 1$. Find $W(1)$.

- (A) $e^{-\frac{7}{2}} + 1$
- (B) $-\frac{1}{e^{\frac{7}{2}}}$
- (C) $e^{-\frac{7}{2}}$
- (D) $\frac{2}{e^{\frac{7}{2}}}$
- (E) $\frac{1}{2e^{\frac{7}{2}}}$

Questions 16–18

16. X, Y are independent Poisson variables with means 17 and 18. Given $X + Y = 19$, find $E[X | X + Y]$.

- (A) $\frac{393}{35}$
- (B) $\frac{323}{70}$
- (C) $\frac{646}{35}$
- (D) $\frac{358}{35}$
- (E) $\frac{323}{35}$

17. For $D = \{(x, y) : x^2 + y^2 \leq 7\}$, evaluate $\iint_D (x^2 + y^2)^1 dA$.

- (A) $\frac{49\pi}{2}$
- (B) $\frac{49\pi}{4}$
- (C) $\frac{7\pi}{2}$
- (D) $\frac{49\pi}{3}$
- (E) 49π

18. Let $A = \begin{bmatrix} 1 & 31 & 0 \\ 0 & 1 & 4 \\ 0 & 0 & 1 \end{bmatrix}$. What is the $(1, 2)$ entry of A^2 ?

- (A) 64
- (B) 63
- (C) 60
- (D) 61
- (E) 62

Questions 19–21

19. Under $x = u + 7v$, $y = u - 2v$, what is the area of the image of $0 \leq u, v \leq 1$?

- (A) 9
- (B) 5
- (C) 81
- (D) $\frac{1}{9}$
- (E) 14

20. X, Y are independent, with variances 17 and 18. Find $\text{Cov}(X + 2Y, 3X - Y)$.

- (A) 20
- (B) 15
- (C) 25
- (D) 10
- (E) 5

21. The region $0 \leq x \leq 1$, $0 \leq y \leq 7x^2$ is revolved about the x -axis. Find its volume.

- (A) $\frac{49\pi}{10}$
- (B) $-\frac{49\pi}{5}$
- (C) $\frac{49\pi}{5}$
- (D) $\frac{98\pi}{5}$
- (E) $1 + \frac{49\pi}{5}$

Questions 22–24

22. An invertible 37×37 matrix A has determinant 4. Find $\det(A^T A)$.

- (A) 15
- (B) 17
- (C) 16
- (D) 18
- (E) 14

23. For the curve $x = t^2$, $y = t^3 + 7t$, find d^2y/dx^2 at $t = 1$.

- (A) -1
- (B) 5
- (C) $\frac{5}{2}$
- (D) $-\frac{7}{2}$
- (E) -2

24. A continuous $f : \mathbb{R} \rightarrow \mathbb{R}$ satisfies $f(q) = q^{12}$ for every rational q . Find $f(2)$.

- (A) 2^{12}
- (B) 2^{14}
- (C) 2^{13}
- (D) 2^{11}
- (E) 2^{15}

Questions 25–27

25. Evaluate $\lim_{x \rightarrow 0} \frac{\sin(7x) - \sum_{j=0}^0 (-1)^j (7x)^{2j+1} / (2j+1)!}{x^3}$.

- (A) $-\frac{(-1)^1 7^3}{3!}$
- (B) $\frac{1}{7} \left(\frac{(-1)^1 7^3}{3!} \right)$
- (C) $3 \left(\frac{(-1)^1 7^3}{3!} \right)$
- (D) $\frac{(-1)^1 7^3}{3!}$
- (E) $7 \left(\frac{(-1)^1 7^3}{3!} \right)$

26. On the space P_{38} of real polynomials of degree at most 38, define $T(p) = p'$. What is the rank of T ?

- (A) 39
- (B) 40
- (C) 37
- (D) 38
- (E) 36

27. The solution of $y' = 7x^2 y^2$ has $y(0) = 1/8$. Find $y(1)$.

- (A) $\frac{6}{17}$
- (B) $-\frac{3}{17}$
- (C) $\frac{3}{17}$
- (D) $\frac{20}{17}$
- (E) $\frac{3}{34}$

Questions 28–30

28. Find the radius of convergence of $\sum_{k=1}^{\infty} k^{12}x^k/12^k$.

- (A) 12
- (B) 4
- (C) 8
- (D) 20
- (E) 16

29. What is the radius of convergence about zero of $\sum_{j=1}^{\infty} \frac{(7j)!}{(j!)^7} x^{2j}$?

- (A) 7^{-7}
- (B) $7^{-\frac{2}{7}}$
- (C) $7^{-\frac{7}{2}}$
- (D) $7^{\frac{7}{2}}$
- (E) $\frac{1}{7}$

30. Subspaces U, V of $\mathbb{R}^{39}$ have dimensions 4 and 5. What is the largest possible value of $\dim(U \cap V)$?

- (A) 6
- (B) 5
- (C) 4
- (D) 2
- (E) 3

Questions 31–33

31. Evaluate $\int_0^1 \int_0^x x^7 y^2 dy dx$.

- (A) $\frac{1}{44}$
- (B) $\frac{1}{24}$
- (C) $\frac{1}{30}$
- (D) $\frac{1}{11}$
- (E) $\frac{1}{33}$

32. On $[0, 1]$, f is 12 on rationals and $1/12$ on irrationals. Find its upper Darboux integral minus its lower Darboux integral.

- (A) $\frac{143}{6}$
- (B) $\frac{155}{12}$
- (C) $\frac{143}{24}$
- (D) $\frac{143}{12}$
- (E) $\frac{167}{12}$

33. The solution of $y' = 7x^1 y^2$, $y(0) = 1$, has its first positive singularity at which x ?

- (A) $\frac{\sqrt{7}}{7}$
- (B) $\frac{2}{7}$
- (C) $\frac{\sqrt{14}}{2}$
- (D) $\frac{2\sqrt{14}}{7}$
- (E) $\frac{\sqrt{14}}{7}$

Questions 34–36

34. Let V consist of real polynomials of degree at most 10 that vanish at 31, 32, and 34. Find $\dim V$.

- (A) 9
- (B) 7
- (C) 10
- (D) 8
- (E) 6

35. If $f(x, y) = \log(x^2 + y^2)$, $x = e^{7t} \cos(2t)$, and $y = e^{7t} \sin(2t)$, find d^2f/dt^2 at $t = 1$.

- (A) 14
- (B) 0
- (C) 196
- (D) 4
- (E) 106

36. A set with 12 elements has the discrete topology. How many of its subsets are simultaneously open and closed?

- (A) 2^{12}
- (B) 2^{14}
- (C) 2^{11}
- (D) 2^{13}
- (E) 2^{15}

Questions 37–39

37. For $x > 0$, $x^2y'' + (1 - 9)xy' + 14y = 0$, $y(1) = 0$, $y'(1) = 7$. Find $y(e)$.

- (A) $\frac{7(1 - e^5)e^2}{5}$
- (B) $-e^2 + e^7$
- (C) $e^2 + e^7$
- (D) $-\frac{7(1 - e^5)e^2}{5}$
- (E) $\frac{e^7}{9}$

38. The roots r, s of $x^2 - 35x + 124 = 0$ are counted with multiplicity. Find $r^2 + s^2$.

- (A) 978
- (B) 977
- (C) 976
- (D) 975
- (E) 979

39. For $f(x) = x^2e^{7x}$, find $f^{(4)}(0)$.

- (A) $\frac{1}{12} \left(\frac{4! 7^2}{2} \right)$
- (B) $\frac{1}{2} \left(\frac{4! 7^2}{2} \right)$
- (C) $\frac{4! 7^2}{2}$
- (D) $2 \left(\frac{4! 7^2}{2} \right)$
- (E) $\frac{2}{7} \left(\frac{4! 7^2}{2} \right)$

Questions 40–42

40. How many zeros, counted with multiplicity, does $z^{12} + 15z + 1$ have in $|z| < 1$?

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

41. Evaluate $\int_0^1 \int_x^1 7y^2 \, dy \, dx$.

- (A) $\frac{7}{8}$
- (B) $\frac{7}{4}$
- (C) $\frac{7}{2}$
- (D) $\frac{7}{3}$
- (E) $\frac{7}{12}$

42. For real t , let $M(t) = \begin{pmatrix} t-31 & 4 & 0 \\ 0 & t-31 & 1 \\ 0 & 0 & t-31 \end{pmatrix}$. At $t = 31$, what is $\text{rank } M(t)$?

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

Questions 43–45

43. Let $f(x) = \log(1 + 7x)$. Find $f^{(2)}(0)$.

- (A) $(-1)^1 1! 7^2$
- (B) $\frac{1}{7} \left((-1)^1 1! 7^2 \right)$
- (C) $-(-1)^1 1! 7^2$
- (D) $2 \left((-1)^1 1! 7^2 \right)$
- (E) $\frac{1}{2} \left((-1)^1 1! 7^2 \right)$

44. A meromorphic function has 14 zeros and 2 poles inside a positively oriented simple closed contour, counted with multiplicity, and no zeros or poles on it. Find $\frac{1}{2\pi i} \int f'(z)/f(z) dz$.

- (A) 4
- (B) 20
- (C) 8
- (D) 12
- (E) 16

45. Solve $y' + 7y = x^2 e^{-7x}$, $y(0) = 0$, and find $y(1)$.

- (A) $\frac{7}{3e^7}$
- (B) e^{-7}
- (C) $\frac{e^7}{3}$
- (D) $\frac{1}{2e^7}$
- (E) $\frac{1}{3e^7}$

Questions 46–48

46. Let $u = (6, 2)^T$ and $v = (1, 0)^T$. Find the squared norm of the orthogonal projection of v onto $\text{span}(u)$.

- (A) $\frac{2}{5}$
- (B) $\frac{19}{10}$
- (C) $\frac{7}{5}$
- (D) $\frac{9}{10}$
- (E) $\frac{12}{5}$

47. Let C be the unit circle $x^2 + y^2 = 1$, $z = 2$, counterclockwise viewed from above. Evaluate $\int_C -7y(x^2 + y^2) dx + (7x(x^2 + y^2)) dy$.

- (A) 14π
- (B) -14π
- (C) 28π
- (D) $1 + 14\pi$
- (E) 7π

48. How many nonnegative integer triples (a, b, c) satisfy $a + b + c = 17$?

- (A) 285
- (B) 114
- (C) 57
- (D) 228
- (E) 171

Questions 49–51

49. Evaluate $\int_0^1 \frac{x^1}{1+7x^2} dx$.

- (A) $-\frac{3 \log(2)}{14}$
- (B) $\frac{3 \log(2)}{14}$
- (C) $\frac{3 \log(2)}{2}$
- (D) $\log(8)$
- (E) $\frac{3 \log(2)}{7}$

50. How many subgroups does the cyclic group of order 420 have?

- (A) 23
- (B) 24
- (C) 22
- (D) 26
- (E) 25

51. Find the coefficient of x^4 in $\cos(7x)/(1-x^2)$.

- (A) 1837
- (B) $\frac{1837}{24}$
- (C) $-\frac{1837}{24}$
- (D) $\frac{1813}{24}$
- (E) $\frac{2401}{24}$

Questions 52–54

52. A tree has 21 vertices. What is the sum of its vertex degrees?

- (A) 53
- (B) 27
- (C) 66
- (D) 40
- (E) 14

53. Evaluate $\lim_{x \rightarrow 0} (1 + 7x)^{1/(1x)}$.

- (A) e^8
- (B) $e^{\frac{1}{7}}$
- (C) e^7
- (D) 7
- (E) e^{49}

54. How many residues x modulo 60 satisfy $2x \equiv 12 \pmod{60}$?

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

Questions 55–57

55. Evaluate $\int_0^1 x^7(1-x)^1 dx$.

- (A) $9 \left(\frac{7! 1!}{9!} \right)$
- (B) $\frac{1}{2} \left(\frac{7! 1!}{9!} \right)$
- (C) $\frac{7! 1!}{9!}$
- (D) $\frac{9}{2} \left(\frac{7! 1!}{9!} \right)$
- (E) $8 \left(\frac{7! 1!}{9!} \right)$

56. A connected planar graph has 20 vertices and 35 edges. How many faces, including the unbounded face, are in a planar embedding?

- (A) 17
- (B) 7
- (C) 12
- (D) 22
- (E) 27

57. Evaluate $\lim_{x \rightarrow 0} \frac{e^{7x} - \sum_{j=0}^1 (7x)^j / j!}{x^2}$.

- (A) $2 \left(\frac{7^2}{2!} \right)$
- (B) $-\frac{7^2}{2!}$
- (C) $\frac{7^2}{2!}$
- (D) $\frac{1}{7} \left(\frac{7^2}{2!} \right)$
- (E) $\frac{1}{2} \left(\frac{7^2}{2!} \right)$

Questions 58–60

58. The field K has 2^7 elements. Find $[K : \mathbb{F}_2]$.

- (A) 6
- (B) 7
- (C) 8
- (D) 5
- (E) 9

59. Near $(0, 0)$, $z = z(x, y)$ satisfies $z + 7z^2 = x + 2y$ and $z(0, 0) = 0$. Find $z_{xy}(0, 0)$.

- (A) 28
- (B) -56
- (C) -28
- (D) -14
- (E) -2

60. How many integers in $\{1, \dots, 102\}$ are divisible by 2 or 3?

- (A) 90
- (B) 112
- (C) 46
- (D) 68
- (E) 24

Questions 61–63

61. Let $\mathbf{F} = (7y^2, z^2, x^2)$. Find $(\nabla \times \mathbf{F})(1, 1, 1) \cdot (0, 0, 1)$.

- (A) 14
- (B) -13
- (C) -14
- (D) -7
- (E) -28

62. Let $G = \mathbb{Z}/216\mathbb{Z} \times \mathbb{Z}/148\mathbb{Z}$. Find the order of $(1, 1)$.

- (A) 7991
- (B) 7994
- (C) 7990
- (D) 7993
- (E) 7992

63. Evaluate $\iiint_B 7(x^2 + y^2 + z^2)^1 dV$, where B is the unit ball.

- (A) $1 + \frac{28\pi}{5}$
- (B) $-\frac{28\pi}{5}$
- (C) $\frac{56\pi}{5}$
- (D) $\frac{14\pi}{5}$
- (E) $\frac{28\pi}{5}$

Questions 64–66

64. Let $F_0 = 0$, $F_1 = 1$, and $F_{k+2} = F_{k+1} + F_k$. How many binary strings of length 17 have no adjacent 1s?

- (A) F_{21}
- (B) F_{18}
- (C) F_{20}
- (D) F_{17}
- (E) F_{19}

65. For $y' = 7y(1 - y/2)$, what is the derivative of the right-hand side with respect to y at the positive equilibrium?

- (A) 7
- (B) -7
- (C) $-\frac{7}{2}$
- (D) -6
- (E) -14

66. How many group homomorphisms $\mathbb{Z}/216\mathbb{Z} \rightarrow \mathbb{Z}/148\mathbb{Z}$ are there?

- (A) 3
- (B) 6
- (C) 2
- (D) 5
- (E) 4

Answer Key

Practice Test 35 / Questions 1–66

Question	Answer	Question	Answer	Question	Answer
1	B	23	A	45	E
2	D	24	A	46	D
3	C	25	D	47	A
4	D	26	D	48	E
5	B	27	C	49	B
6	E	28	A	50	B
7	A	29	C	51	B
8	E	30	C	52	D
9	B	31	E	53	C
10	D	32	D	54	D
11	A	33	E	55	C
12	E	34	D	56	A
13	A	35	B	57	C
14	A	36	A	58	B
15	C	37	D	59	C
16	E	38	B	60	D
17	A	39	C	61	C
18	E	40	B	62	E
19	A	41	B	63	E
20	B	42	C	64	E
21	C	43	A	65	B
22	C	44	D	66	E

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