

GRE Mathematics Practice Test 95

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 18 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. Find the total outward flux of $\mathbf{F} = (19x^2, y^2, z^2)$ through the boundary of $[0, 1]^3$.

- (A) 21
- (B) $\frac{21}{2}$
- (C) -21
- (D) 42
- (E) 22

2. An idempotent 97×97 real matrix P has rank 3. What is $\text{tr } P$?

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

3. Find the coefficient of x^2 in the Taylor series of $(1 - 19x)^{-2}$ at zero.

- (A) $\frac{1}{19} (3 \cdot 19^2)$
- (B) $2 (3 \cdot 19^2)$
- (C) $\frac{1}{3} (3 \cdot 19^2)$
- (D) $\frac{2}{3} (3 \cdot 19^2)$
- (E) $3 \cdot 19^2$

Questions 4–6

4. Let $X_1, \dots, X_{42}$ be independent uniform random variables on $[0, 1]$. What is $E[\max_i X_i]$?

- (A) $\frac{42}{43}$
- (B) $\frac{21}{43}$
- (C) $\frac{14}{43}$
- (D) $\frac{85}{86}$
- (E) $\frac{1}{43}$

5. Let $\mathbf{F} = (19y^2, z^2, x^2)$. Find $(\nabla \times \mathbf{F})(1, 1, 1) \cdot (0, 0, 1)$.

- (A) -37
- (B) -76
- (C) -19
- (D) -38
- (E) 38

6. For $A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \\ 1 & 0 \end{bmatrix}$ and $b = \begin{bmatrix} 91 \\ 10 \\ 101 \end{bmatrix}$, let x minimize $\|Ax - b\|^2$. Find x_2 .

- (A) 10
- (B) 12
- (C) 11
- (D) 8
- (E) 9

Questions 7–9

7. For which positive integer m does $\sum_{j=2}^{\infty} \frac{(-1)^j (x-19)^j}{j^{\frac{1}{3}} (\log j)^m}$ converge absolutely at $x = 18$? Give the least such m , or 0 if none exists.

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

8. Independent trials have success probability $1/42$. Let T count trials up to and including the first success. Find $E[T]$.

- (A) 70
- (B) 28
- (C) 14
- (D) 42
- (E) 56

9. Evaluate $\sum_{j=0}^{\infty} \frac{1}{(19+2j)(21+2j)}$.

- (A) $\frac{1}{38}$
- (B) $\frac{1}{21}$
- (C) $\frac{1}{2}$
- (D) $\frac{1}{19}$
- (E) $\frac{2}{19}$

Questions 10–12

10. What is the coefficient of x^2 in $(x + 18)^4$?

- (A) 1945
- (B) 1944
- (C) 1942
- (D) 1943
- (E) 1946

11. Evaluate $\int_0^1 \int_0^x x^{19} y^2 \, dy \, dx$.

- (A) $\frac{1}{92}$
- (B) $\frac{1}{23}$
- (C) $\frac{1}{69}$
- (D) $\frac{1}{66}$
- (E) $\frac{1}{60}$

12. A uniformly random subset of 42 objects is selected from a collection with 43 red and 44 blue objects. If X is the number of red objects selected, find $E[X]$.

- (A) $\frac{602}{29}$
- (B) $\frac{1204}{29}$
- (C) $\frac{301}{29}$
- (D) $\frac{660}{29}$
- (E) $\frac{631}{29}$

Questions 13–15

13. Evaluate $\int_0^1 x^{19}(1-x)^1 dx$.

- (A) $\frac{19! 1!}{21!}$
- (B) $\frac{1}{2} \left(\frac{19! 1!}{21!} \right)$
- (C) $20 \left(\frac{19! 1!}{21!} \right)$
- (D) $\frac{21}{2} \left(\frac{19! 1!}{21!} \right)$
- (E) $21 \left(\frac{19! 1!}{21!} \right)$

14. A matrix A satisfies $(A - 92I)(A - 94I) = 0$, and its minimal polynomial has degree two. If $A^2 = uA + vI$, find u .

- (A) 188
- (B) 187
- (C) 186
- (D) 185
- (E) 184

15. Near $(0, 0)$, $z = z(x, y)$ satisfies $z + 19z^2 = x + 2y$ and $z(0, 0) = 0$. Find $z_{xy}(0, 0)$.

- (A) -76
- (B) -38
- (C) 76
- (D) -152
- (E) -2

Questions 16–18

16. X, Y are independent Poisson variables with means 42 and 43. Given $X + Y = 44$, find $E[X \mid X + Y]$.

- (A) $\frac{2018}{85}$
- (B) $\frac{3696}{85}$
- (C) $\frac{1933}{85}$
- (D) $\frac{924}{85}$
- (E) $\frac{1848}{85}$

17. Solve $y' + 19y = x^2e^{-19x}$, $y(0) = 0$, and find $y(1)$.

- (A) $\frac{1}{2e^{19}}$
- (B) e^{-19}
- (C) $\frac{1}{3e^{19}}$
- (D) $\frac{19}{3e^{19}}$
- (E) $\frac{e^{19}}{3}$

18. Let $V = \begin{bmatrix} 1 & 91 & 8281 \\ 1 & 93 & 8649 \\ 1 & 96 & 9216 \end{bmatrix}$. Find $\det V$.

- (A) 30
- (B) 29
- (C) 31
- (D) 32
- (E) 28

Questions 19–21

19. Evaluate $\iiint_B 19(x^2 + y^2 + z^2)^1 dV$, where B is the unit ball.

- (A) $1 + \frac{76\pi}{5}$
- (B) $\frac{152\pi}{5}$
- (C) $\frac{76\pi}{5}$
- (D) $\frac{38\pi}{5}$
- (E) $-\frac{76\pi}{5}$

20. X, Y are independent, with variances 42 and 43. Find $\text{Cov}(X + 2Y, 3X - Y)$.

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

21. If $y' = 19y$, $y(0) = 1$, what is the coefficient of x^2 in the Maclaurin series of y ?

- (A) $\frac{361}{4}$
- (B) $\frac{363}{2}$
- (C) 361
- (D) $\frac{361}{2}$
- (E) $-\frac{361}{2}$

Questions 22–24

22. Let $u = (1, 2, \dots, 97)^T$, $v = (1, 1, \dots, 1)^T$, and $B = I + uv^T$. Find $\det B$.

- (A) 4755
- (B) 4754
- (C) 4753
- (D) 4752
- (E) 4756

23. Evaluate $\int_C (2x + 19y) dx + (19x + 2y) dy$, where C is the line segment from $(0, 0)$ to $(6, 1)$.

- (A) 152
- (B) -151
- (C) $\frac{151}{2}$
- (D) 302
- (E) 151

24. A continuous $f : \mathbb{R} \rightarrow \mathbb{R}$ satisfies $f(q) = q^{32}$ for every rational q . Find $f(2)$.

- (A) 2^{34}
- (B) 2^{33}
- (C) 2^{32}
- (D) 2^{31}
- (E) 2^{35}

Questions 25–27

25. Find the arc length of $r(t) = (19t, 2t)$ for $0 \leq t \leq 1$.

- (A) $-\sqrt{365}$
- (B) $\sqrt{365}$
- (C) $\frac{\sqrt{365}}{2}$
- (D) $2\sqrt{365}$
- (E) $1 + \sqrt{365}$

26. Let D be a diagonal 97×97 real matrix with distinct diagonal entries. What is the dimension of the space of matrices X satisfying $XD = DX$?

- (A) 95
- (B) 96
- (C) 99
- (D) 97
- (E) 98

27. Find the curvature at $t = 0$ of $r(t) = (2t, 19t^2)$.

- (A) $\frac{19}{4}$
- (B) $\frac{21}{2}$
- (C) $\frac{19}{2}$
- (D) $-\frac{19}{2}$
- (E) 19

Questions 28–30

28. Find the radius of convergence of $\sum_{k=1}^{\infty} k^{32} x^k / 32^k$.

- (A) 12
- (B) 22
- (C) 52
- (D) 32
- (E) 42

29. Evaluate $\int_0^1 x^{18} (\log x)^1 dx$.

- (A) $\frac{1}{2} \left(\frac{(-1)^1 1!}{19^2} \right)$
- (B) $19 \left(\frac{(-1)^1 1!}{19^2} \right)$
- (C) $2 \left(\frac{(-1)^1 1!}{19^2} \right)$
- (D) $-\frac{(-1)^1 1!}{19^2}$
- (E) $\frac{(-1)^1 1!}{19^2}$

30. What is the remainder when $x^2 + 1$ is divided by $x - 92$?

- (A) 8466
- (B) 8465
- (C) 8467
- (D) 8464
- (E) 8463

Questions 31–33

31. Let $f(x) = \log(1 + 19x)$. Find $f^{(2)}(0)$.

- (A) $2 \left((-1)^1 1! 19^2 \right)$
- (B) $\frac{1}{2} \left((-1)^1 1! 19^2 \right)$
- (C) $(-1)^1 1! 19^2$
- (D) $-(-1)^1 1! 19^2$
- (E) $\frac{1}{19} \left((-1)^1 1! 19^2 \right)$

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

- (A) $\frac{1023}{16}$
- (B) $\frac{1087}{32}$
- (C) $\frac{1055}{32}$
- (D) $\frac{1023}{64}$
- (E) $\frac{1023}{32}$

33. If $y' + 19y = 2e^{-19x}$ and $y(0) = 6$, find $y(1)$.

- (A) $-\frac{8}{e^{19}}$
- (B) $\frac{16}{e^{19}}$
- (C) $\frac{4}{e^{19}}$
- (D) $\frac{8}{e^{19}}$
- (E) $\frac{8}{e^{19}} + 1$

Questions 34–36

34. Let $P = \text{diag}(\underbrace{1, \dots, 1}_1, \underbrace{0, \dots, 0}_{97})$. What is the dimension of the space of 98×98 real matrices X satisfying $PX = X$?

- (A) 99
- (B) 100
- (C) 97
- (D) 98
- (E) 96

35. For $x > 0$, $x^2 y'' + (1 - 21)xy' + 38y = 0$, $y(1) = 0$, $y'(1) = 19$. Find $y(e)$.

- (A) $-\frac{19(1 - e^{17})e^2}{17}$
- (B) $\frac{19(1 - e^{17})e^2}{17}$
- (C) $\frac{e^{19}}{21}$
- (D) $-e^2 + e^{19}$
- (E) $e^2 + e^{19}$

36. A set with 32 elements has the discrete topology. How many of its subsets are simultaneously open and closed?

- (A) 2^{34}
- (B) 2^{31}
- (C) 2^{33}
- (D) 2^{35}
- (E) 2^{32}

Questions 37–39

37. Evaluate $\int_0^1 \frac{x^1}{1 + 19x^2} dx$.

- (A) $\frac{\log(20)}{38}$
- (B) $\frac{\log(20)}{2}$
- (C) $-\frac{\log(20)}{38}$
- (D) $\log(20)$
- (E) $\frac{\log(20)}{19}$

38. A 3×3 matrix A has characteristic polynomial $(t - 91)(t + 1)(t - 2)$. What is $\text{tr}(A^2)$?

- (A) 8284
- (B) 8287
- (C) 8288
- (D) 8286
- (E) 8285

39. Solve $y'' - 40y' + 399y = 0$ with $y(0) = 1$, $y'(0) = 0$. Find $y(1)$.

- (A) $\frac{(-21 + 19e^2)e^{19}}{2}$
- (B) $\frac{(21 - 19e^2)e^{19}}{2}$
- (C) $(21 - 19e^2)e^{19}$
- (D) $\frac{(21 - 19e^2)e^{19}}{4}$
- (E) $\frac{(21 - 19e^2)e^{19}}{2} + 1$

Questions 40–42

40. How many zeros, counted with multiplicity, does $z^{27} + 30z + 1$ have in $|z| < 1$?
- (A) 4
(B) 0
(C) 1
(D) 2
(E) 3
41. For the curve $x = t^2$, $y = t^3 + 19t$, find d^2y/dx^2 at $t = 1$.
- (A) -8
(B) $-\frac{19}{2}$
(C) 11
(D) $\frac{11}{2}$
(E) -4
42. Let N be the 97×97 matrix with ones immediately above the diagonal and zeros elsewhere. Find $\text{rank } N^{16}$.
- (A) 83
(B) 79
(C) 80
(D) 82
(E) 81

Questions 43–45

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

- (A) 38
- (B) 17
- (C) $\frac{1}{21}$
- (D) 441
- (E) 21

44. A meromorphic function has 29 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) 18
- (B) 9
- (C) 36
- (D) 45
- (E) 27

45. Find the upward flux of $\mathbf{F} = (0, 0, z)$ through $z = 19x^2 + 2y^2$, $0 \leq x, y \leq 1$.

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

Questions 46–48

46. Let A be the 97×97 matrix whose diagonal entries are 94 and whose off-diagonal entries are 1. What is its smallest eigenvalue?

- (A) 94
- (B) 92
- (C) 93
- (D) 95
- (E) 91

47. For $T = \{x, y, z \geq 0 : x + y + z \leq 1\}$, evaluate $\iiint_T x^{19} y^1 dV$.

- (A) $6 \left(\frac{19! 1!}{23!} \right)$
- (B) $\frac{1}{40}$
- (C) $\frac{19! 1!}{23!}$
- (D) $\frac{1}{6} \left(\frac{19! 1!}{23!} \right)$
- (E) $23 \left(\frac{19! 1!}{23!} \right)$

48. How many nonnegative integer triples (a, b, c) satisfy $a + b + c = 42$?

- (A) 631
- (B) 946
- (C) 1576
- (D) 316
- (E) 1261

Questions 49–51

49. If $f(x, y) = \log(x^2 + y^2)$, $x = e^{19t} \cos(2t)$, and $y = e^{19t} \sin(2t)$, find $d^2 f/dt^2$ at $t = 1$.

- (A) 4
- (B) 0
- (C) 38
- (D) 730
- (E) 1444

50. In $\mathbb{Z}/3018\mathbb{Z}$, how many residues are idempotent ($x^2 = x$)?

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

51. For $x > 0$, $xy' = 19y$ and $y(1) = 1$. Find $y(e^2)$.

- (A) $2e^{38}$
- (B) e^{38}
- (C) $1 + e^{38}$
- (D) $-e^{38}$
- (E) $\frac{e^{38}}{2}$

Questions 52–54

52. A tree has 46 vertices. What is the sum of its vertex degrees?

- (A) 150
- (B) 90
- (C) 30
- (D) 120
- (E) 60

53. Evaluate $\iiint_{x^2+y^2+z^2 \leq 19} (x^2 + y^2 + z^2)^1 dV$.

- (A) $5 \left(\frac{4\pi 19^{\frac{5}{2}}}{5} \right)$
- (B) $\frac{1}{2} \left(\frac{4\pi 19^{\frac{5}{2}}}{5} \right)$
- (C) $\frac{1}{3} \left(\frac{4\pi 19^{\frac{5}{2}}}{5} \right)$
- (D) $\frac{4\pi 19^{\frac{5}{2}}}{5}$
- (E) $\frac{5}{57} \left(\frac{4\pi 19^{\frac{5}{2}}}{5} \right)$

54. In the additive group $\mathbb{Z}/132\mathbb{Z}$, find the order of $[3]$.

- (A) 42
- (B) 46
- (C) 45
- (D) 44
- (E) 43

Questions 55–57

55. For $f(x, y) = x^2 + 19xy + 2y^2$, what is its maximum directional derivative at $(1, -1)$?

- (A) 514
- (B) $\sqrt{514}$
- (C) 15
- (D) -17
- (E) 32

56. A connected planar graph has 45 vertices and 85 edges. How many faces, including the unbounded face, are in a planar embedding?

- (A) 70
- (B) 14
- (C) 56
- (D) 28
- (E) 42

57. For $\mathbf{F} = (19x^2, y^2, z^2)$, find $\nabla \cdot \mathbf{F}$ at $(1, 2, 1)$.

- (A) 45
- (B) -44
- (C) 44
- (D) 88
- (E) 22

Questions 58–60

58. How many invertible 2×2 matrices over $\mathbb{F}_{61}$ are there?

- (A) $(61^2 - 61^0)(61^2 - 61^0)$
- (B) $61^2 61^2$
- (C) $(61^2 - 61^1)(61^2 - 61^2)$
- (D) $(61^2 - 61^0)$
- (E) $(61^2 - 61^0)(61^2 - 61^1)$

59. For $y' = 19y(1 - y/2)$, what is the derivative of the right-hand side with respect to y at the positive equilibrium?

- (A) 19
- (B) -19
- (C) -38
- (D) $-\frac{19}{2}$
- (E) -18

60. How many integers in $\{1, \dots, 252\}$ are divisible by 2 or 3?

- (A) 112
- (B) 56
- (C) 280
- (D) 224
- (E) 168

Questions 61–63

61. Evaluate $\int_0^1 \int_x^1 19y^2 \, dy \, dx$.

- (A) $\frac{19}{8}$
- (B) $\frac{19}{12}$
- (C) $\frac{19}{4}$
- (D) $\frac{19}{3}$
- (E) $\frac{19}{2}$

62. How many permutations in S_{97} consist of one 4-cycle and 93 fixed points?

- (A) $2^4 \cdot 3^2 \cdot 5 \cdot 19 \cdot 47 \cdot 97$
- (B) $2^4 \cdot 3 \cdot 5^2 \cdot 19 \cdot 47 \cdot 97$
- (C) $2^4 \cdot 3 \cdot 5 \cdot 19 \cdot 47 \cdot 97$
- (D) $2^3 \cdot 3 \cdot 5 \cdot 19 \cdot 47 \cdot 97$
- (E) $2^5 \cdot 3 \cdot 5 \cdot 19 \cdot 47 \cdot 97$

63. Evaluate $\lim_{x \rightarrow 0} (1 + 19x)^{1/(1x)}$.

- (A) e^{19}
- (B) e^{361}
- (C) e^{20}
- (D) 19
- (E) $e^{\frac{1}{19}}$

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 42 have no adjacent 1s?

- (A) F_{43}
- (B) F_{45}
- (C) F_{44}
- (D) F_{42}
- (E) F_{46}

65. Let $F(x) = \int_0^x (x-t)^1 e^{19t} dt$. Find $F^{(2)}(0)$.

- (A) 1
- (B) 2
- (C) 19
- (D) 0
- (E) $\frac{1}{2}$

66. How many subgroups does the cyclic group of order 1140 have?

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

Answer Key

Practice Test 95 / Questions 1–66

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

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