

GRE Mathematics Practice Test 34

Bridge to Standard

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 bridge toward standard practice, with routine multi-step questions and a smaller number of challenging concepts. This is cycle 6 of 19, position 4 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.

zarimion.com/gre

100 practice tests, complete answer keys, and future updates.

Please retain the source attribution when sharing this material.



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. If $y'' + 9y = 0$, $y(0) = 7$, and $y'(0) = 5$, find $y(\pi/6)$.

- (A) $-\frac{5}{3}$
- (B) $\frac{5}{3}$
- (C) $\frac{10}{3}$
- (D) $\frac{8}{3}$
- (E) $\frac{5}{6}$

2. What is the remainder when $x^2 + 1$ is divided by $x - 31$?

- (A) 964
- (B) 963
- (C) 960
- (D) 962
- (E) 961

3. Evaluate $\int_0^1 \int_0^x x^7 y^3 dy dx$.

- (A) $\frac{1}{32}$
- (B) $\frac{1}{44}$
- (C) $\frac{1}{48}$
- (D) $\frac{1}{12}$
- (E) $\frac{1}{60}$

Questions 4–6

4. Let $X_1, \dots, X_{16}$ be independent uniform random variables on $[0, 1]$. What is $E[\max_i X_i]$?

- (A) $\frac{1}{17}$
- (B) $\frac{16}{17}$
- (C) $\frac{16}{51}$
- (D) $\frac{33}{34}$
- (E) $\frac{8}{17}$

5. For $f(x) = x^3 e^{7x}$, find $f^{(5)}(0)$.

- (A) $\frac{1}{20} \left(\frac{5! 7^2}{2} \right)$
- (B) $\frac{1}{60} \left(\frac{5! 7^2}{2} \right)$
- (C) $2 \left(\frac{5! 7^2}{2} \right)$
- (D) $\frac{2}{7} \left(\frac{5! 7^2}{2} \right)$
- (E) $\frac{5! 7^2}{2}$

6. Let $P = \text{diag}(\underbrace{1, \dots, 1}_4, \underbrace{0, \dots, 0}_{33})$. What is the dimension of the space of 37×37 real matrices X satisfying $PX = X$?

- (A) 149
- (B) 148
- (C) 147
- (D) 146
- (E) 150

Questions 7–9

7. What is the radius of convergence about zero of $\sum_{j=1}^{\infty} \frac{(7j)!}{(j!)^7} x^{3j}$?

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

8. Independent trials have success probability $1/16$. Let T count trials up to and including the first success. Find $E[T]$.

- (A) 11
- (B) 16
- (C) 26
- (D) 21
- (E) 6

9. Evaluate $\lim_{x \rightarrow 0} \frac{e^{7x} - \sum_{j=0}^2 (7x)^j / j!}{x^3}$.

- (A) $6 \left(\frac{7^3}{3!} \right)$
- (B) $3 \left(\frac{7^3}{3!} \right)$
- (C) $\frac{1}{7} \left(\frac{7^3}{3!} \right)$
- (D) $\frac{7^3}{3!}$
- (E) $-\frac{7^3}{3!}$

Questions 10–12

10. A 3×3 matrix A has characteristic polynomial $(t - 30)(t + 1)(t - 2)$. What is $\text{tr}(A^2)$?

- (A) 904
- (B) 903
- (C) 906
- (D) 907
- (E) 905

11. For $\mathbf{F} = (7x^3, y^3, z^3)$, find $\nabla \cdot \mathbf{F}$ at $(1, 2, 1)$.

- (A) -36
- (B) 18
- (C) 72
- (D) 37
- (E) 36

12. A uniformly random subset of 16 objects is selected from a collection with 17 red and 18 blue objects. If X is the number of red objects selected, find $E[X]$.

- (A) $\frac{136}{35}$
- (B) $\frac{342}{35}$
- (C) $\frac{307}{35}$
- (D) $\frac{272}{35}$
- (E) $\frac{544}{35}$

Questions 13–15

13. The solution of $y' = 7x^3y^2$ has $y(0) = 1/8$. Find $y(1)$.

- (A) $-\frac{4}{25}$
- (B) $\frac{29}{25}$
- (C) $\frac{8}{25}$
- (D) $\frac{2}{25}$
- (E) $\frac{4}{25}$

14. Let N be the 36×36 matrix with ones immediately above the diagonal and zeros elsewhere. Find $\text{rank } N^4$.

- (A) 30
- (B) 34
- (C) 31
- (D) 32
- (E) 33

15. For $x > 0$, $xy' = 7y$ and $y(1) = 1$. Find $y(e^3)$.

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

Questions 16–18

16. X, Y are independent Poisson variables with means 16 and 17. Given $X + Y = 18$, find $\text{Var}(X | X + Y)$.

- (A) $\frac{665}{121}$
- (B) $\frac{544}{121}$
- (C) $\frac{272}{121}$
- (D) $\frac{786}{121}$
- (E) $\frac{1088}{121}$

17. Solve $y' + 7y = x^3e^{-7x}$, $y(0) = 0$, and find $y(1)$.

- (A) $\frac{1}{3e^7}$
- (B) e^{-7}
- (C) $\frac{7}{4e^7}$
- (D) $\frac{1}{4e^7}$
- (E) $\frac{e^7}{4}$

18. Let A be the 36×36 matrix whose diagonal entries are 33 and whose off-diagonal entries are 1. What is its smallest eigenvalue?

- (A) 33
- (B) 34
- (C) 32
- (D) 30
- (E) 31

Questions 19–21

19. Solve $y'' - 17y' + 70y = 0$ with $y(0) = 1$, $y'(0) = 0$. Find $y(1)$.

- (A) $\frac{(-10 + 7e^3)e^7}{3}$
- (B) $\frac{(10 - 7e^3)e^7}{6}$
- (C) $\frac{(10 - 7e^3)e^7}{3} + 1$
- (D) $\frac{2(10 - 7e^3)e^7}{3}$
- (E) $\frac{(10 - 7e^3)e^7}{3}$

20. X, Y are independent, with variances 16 and 17. Find $\text{Cov}(X + 2Y, 3X - Y)$.

- (A) 10
- (B) 14
- (C) 6
- (D) 22
- (E) 18

21. Let C be the unit circle $x^2 + y^2 = 1$, $z = 3$, counterclockwise viewed from above. Evaluate $\int_C -7y(x^2 + y^2)^2 dx + (7x(x^2 + y^2)^2) dy$.

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

Questions 22–24

22. Positive real numbers x, y satisfy $\log_2 x + \log_2 y = \log_2 180$ and $x + y = 36$. Find xy .

- (A) 182
- (B) 178
- (C) 180
- (D) 179
- (E) 181

23. Near $(0, 0)$, $z = z(x, y)$ satisfies $z + 7z^2 = x + 3y$ and $z(0, 0) = 0$. Find $z_{xy}(0, 0)$.

- (A) -21
- (B) -14
- (C) -3
- (D) 42
- (E) -42

24. A continuous $f : \mathbb{R} \rightarrow \mathbb{R}$ satisfies $f(q) = q^{11}$ for every rational q . Find $f(2)$.

- (A) 2^{12}
- (B) 2^{10}
- (C) 2^{11}
- (D) 2^{13}
- (E) 2^{14}

Questions 25–27

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

- (A) $\frac{14^{\frac{2}{3}}\sqrt[3]{3}}{14}$
- (B) $\frac{3}{7}$
- (C) $\frac{\sqrt[3]{3} \cdot 7^{\frac{2}{3}}}{7}$
- (D) $\frac{7^{\frac{2}{3}}}{7}$
- (E) $\frac{3^{\frac{2}{3}}\sqrt[3]{7}}{3}$

26. A sequence satisfies $u_0 = 30$ and $u_{k+1} = 1u_k + 6$ for all $k \geq 0$. Find u_6 .

- (A) 68
- (B) 67
- (C) 65
- (D) 66
- (E) 64

27. Evaluate $\lim_{x \rightarrow 0} \frac{\sin(7x) - \sum_{j=0}^1 (-1)^j (7x)^{2j+1} / (2j+1)!}{x^5}$.

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

Questions 28–30

28. Find the radius of convergence of $\sum_{k=1}^{\infty} k^{11}x^k/11^k$.

- (A) 17
- (B) 11
- (C) 5
- (D) 14
- (E) 8

29. Let $F(x) = \int_0^{x^3} e^{7t} dt$. Find $F'(1)$.

- (A) e^7
- (B) e^{21}
- (C) $3e^7$
- (D) $21e^7$
- (E) $\frac{e^7}{3}$

30. A linear map $T : \mathbb{R}^{37} \rightarrow \mathbb{R}^{39}$ has rank 4. What is its nullity?

- (A) 34
- (B) 31
- (C) 32
- (D) 33
- (E) 35

Questions 31–33

31. Evaluate $\int_0^1 \frac{x^2}{1+7x^3} dx$.

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

32. On $[0, 1]$, f is 11 on rationals and $1/11$ on irrationals. Find its upper Darboux integral minus its lower Darboux integral.

- (A) $\frac{60}{11}$
- (B) $\frac{240}{11}$
- (C) $\frac{142}{11}$
- (D) $\frac{120}{11}$
- (E) $\frac{131}{11}$

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

- (A) $\frac{49\pi}{3}$
- (B) 343π
- (C) $\frac{343\pi}{5}$
- (D) $\frac{686\pi}{3}$
- (E) $\frac{343\pi}{3}$

Questions 34–36

34. What is the dimension of the real vector space of 36×36 symmetric matrices?

- (A) 665
- (B) 664
- (C) 668
- (D) 666
- (E) 667

35. If $y' = 7y$, $y(0) = 1$, what is the coefficient of x^3 in the Maclaurin series of y ?

- (A) $-\frac{343}{6}$
- (B) $\frac{343}{6}$
- (C) $\frac{343}{3}$
- (D) $\frac{349}{6}$
- (E) $\frac{343}{12}$

36. A set with 11 elements has the discrete topology. How many of its subsets are simultaneously open and closed?

- (A) 2^{13}
- (B) 2^{11}
- (C) 2^{14}
- (D) 2^{12}
- (E) 2^{10}

Questions 37–39

37. For $f(x, y) = x^2 + 7xy + 3y^2$, what is its maximum directional derivative at $(1, -1)$?

- (A) 26
- (B) 1
- (C) -5
- (D) 6
- (E) $\sqrt{26}$

38. Let $A = \begin{bmatrix} 1 & 30 & 0 \\ 0 & 1 & 6 \\ 0 & 0 & 1 \end{bmatrix}$. What is the $(1, 2)$ entry of A^6 ?

- (A) 180
- (B) 181
- (C) 179
- (D) 182
- (E) 178

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

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

Questions 40–42

40. How many zeros, counted with multiplicity, does $z^{11} + 14z + 1$ have in $|z| < 1$?

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

41. Evaluate $\sum_{j=0}^{\infty} \frac{1}{(7+3j)(10+3j)}$.

- (A) $\frac{1}{10}$
- (B) $\frac{3}{7}$
- (C) $\frac{1}{21}$
- (D) $\frac{1}{7}$
- (E) $\frac{1}{3}$

42. An invertible 36×36 matrix A has determinant 3. Find $\det(A^T A)$.

- (A) 9
- (B) 10
- (C) 7
- (D) 8
- (E) 11

Questions 43–45

43. For the curve $x = t^3$, $y = t^4 + 7t$, find d^2y/dx^2 at $t = 1$.

- (A) 2
- (B) $-\frac{10}{3}$
- (C) $-\frac{7}{3}$
- (D) $\frac{11}{3}$
- (E) $-\frac{10}{9}$

44. A meromorphic function has 13 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) 11
- (B) 17
- (C) 8
- (D) 5
- (E) 14

45. Let C be $x^2/9 + y^2 = 1$, oriented counterclockwise. Evaluate $\int_C (-y) dx + (7x) dy$.

- (A) 24π
- (B) -24π
- (C) $1 + 24\pi$
- (D) 12π
- (E) 48π

Questions 46–48

46. In $R = \mathbb{F}_3[x]/(x^7)$, how many elements are there?

- (A) 3^8
- (B) 3^7
- (C) 3^9
- (D) 3^{10}
- (E) 3^6

47. Evaluate $\int_0^1 x^6(\log x)^2 dx$.

- (A) $\frac{(-1)^2 2!}{7^3}$
- (B) $7 \left(\frac{(-1)^2 2!}{7^3} \right)$
- (C) $\frac{49}{2} \left(\frac{(-1)^2 2!}{7^3} \right)$
- (D) $\frac{1}{3} \left(\frac{(-1)^2 2!}{7^3} \right)$
- (E) $-\frac{(-1)^2 2!}{7^3}$

48. How many nonnegative integer triples (a, b, c) satisfy $a + b + c = 16$?

- (A) 255
- (B) 204
- (C) 102
- (D) 51
- (E) 153

Questions 49–51

49. What is the maximum of x^3y^7 over $x, y \geq 0$ subject to $x + y = 1$?

- (A) $\frac{1}{2^{10}}$
- (B) $10 \left(\left(\frac{3}{10} \right)^3 \left(\frac{7}{10} \right)^7 \right)$
- (C) $\left(\frac{3}{10} \right)^7 \left(\frac{7}{10} \right)^3$
- (D) $\left(\frac{3}{10} \right)^3 \left(\frac{7}{10} \right)^7$
- (E) $\frac{21}{100}$

50. Integers x satisfy $x \equiv 4 \pmod{7}$ and $x \equiv 7 \pmod{9}$. Find the least nonnegative solution.

- (A) 23
- (B) 27
- (C) 25
- (D) 24
- (E) 26

51. Evaluate $\int_C (3x^2 + 7y) dx + (7x + 3y^2) dy$, where C is the line segment from $(0, 0)$ to $(5, 1)$.

- (A) 162
- (B) -161
- (C) 161
- (D) 322
- (E) $\frac{161}{2}$

Questions 52–54

52. A tree has 20 vertices. What is the sum of its vertex degrees?

- (A) 50
- (B) 14
- (C) 62
- (D) 38
- (E) 26

53. Find the arc length of $r(t) = (7t, 3t)$ for $0 \leq t \leq 1$.

- (A) $-\sqrt{58}$
- (B) $1 + \sqrt{58}$
- (C) $\sqrt{58}$
- (D) $2\sqrt{58}$
- (E) $\frac{\sqrt{58}}{2}$

54. The symmetric group S_{36} acts on $\{1, \dots, 36\}$. What is the index of the stabilizer of 1?

- (A) 37
- (B) 34
- (C) 36
- (D) 38
- (E) 35

Questions 55–57

55. Find the total outward flux of $\mathbf{F} = (7x^3, y^3, z^3)$ through the boundary of $[0, 1]^3$.
- (A) $\frac{9}{2}$
 - (B) 10
 - (C) -9
 - (D) 18
 - (E) 9
56. A connected planar graph has 19 vertices and 33 edges. How many faces, including the unbounded face, are in a planar embedding?
- (A) 21
 - (B) 6
 - (C) 26
 - (D) 16
 - (E) 11
57. Evaluate $\iiint_B 7(x^2 + y^2 + z^2)^{3/2} dV$, where B is the unit ball.
- (A) $\frac{14\pi}{3}$
 - (B) $\frac{7\pi}{3}$
 - (C) $1 + \frac{14\pi}{3}$
 - (D) $\frac{28\pi}{3}$
 - (E) $-\frac{14\pi}{3}$

Questions 58–60

58. In $\mathbb{Z}/894\mathbb{Z}$, how many residues are idempotent ($x^2 = x$)?

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

59. Let $\mathbf{F} = (7y^3, z^3, x^3)$. Find $(\nabla \times \mathbf{F})(1, 1, 1) \cdot (0, 0, 1)$.

- (A) -20
- (B) -21
- (C) $-\frac{21}{2}$
- (D) 21
- (E) -42

60. How many integers in $\{1, \dots, 96\}$ are divisible by 2 or 3?

- (A) 64
- (B) 22
- (C) 43
- (D) 106
- (E) 85

Questions 61–63

61. Find the coefficient of x^6 in $\cos(7x)/(1 - 2x^2)$.

- (A) -38389
- (B) $-\frac{117649}{720}$
- (C) $-\frac{39109}{720}$
- (D) $\frac{38389}{720}$
- (E) $-\frac{38389}{720}$

62. In the additive group $\mathbb{Z}/54\mathbb{Z}$, find the order of $[2]$.

- (A) 27
- (B) 26
- (C) 28
- (D) 29
- (E) 25

63. Find the coefficient of x^3 in the Taylor series of $(1 - 7x)^{-2}$ at zero.

- (A) $\frac{3}{4}(4 \cdot 7^3)$
- (B) $\frac{1}{4}(4 \cdot 7^3)$
- (C) $-4 \cdot 7^3$
- (D) $4 \cdot 7^3$
- (E) $\frac{1}{7}(4 \cdot 7^3)$

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 16 have no adjacent 1s?

- (A) F_{18}
- (B) F_{20}
- (C) F_{17}
- (D) F_{19}
- (E) F_{16}

65. For $T = \{x, y, z \geq 0 : x + y + z \leq 1\}$, evaluate $\iiint_T x^7 y^2 dV$.

- (A) $\frac{1}{6} \left(\frac{7! 2!}{12!} \right)$
- (B) $\frac{7! 2!}{12!}$
- (C) $6 \left(\frac{7! 2!}{12!} \right)$
- (D) $12 \left(\frac{7! 2!}{12!} \right)$
- (E) $\frac{1}{24}$

66. How many invertible 2×2 matrices over $\mathbb{F}_{13}$ are there with determinant 1?

- (A) $\frac{(13^2 - 13^1)(13^2 - 13^2)}{12}$
- (B) $\frac{(13^2 - 13^0)(13^2 - 13^1)}{12}$
- (C) $\frac{(13^2 - 13^0)}{12}$
- (D) $\frac{13^2 13^2}{12}$
- (E) $\frac{(13^2 - 13^0)(13^2 - 13^0)}{12}$

Answer Key

Practice Test 34 / Questions 1–66

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

zarimion.com/gre

100 practice tests, complete answer keys, and future updates.
Please retain the source attribution when sharing this material.

