GRE MATHEMATICS
TEST VI

TIME: 2 hours and 50 minutes
66 Questions

DIRECTIONS: Choose the best answer for each question and mark the letter of your selection on the corresponding answer sheet.

1. Let $f(x) = \left(\frac{\sin x}{x}\right)^{(1/x^2)}$. Evaluate $\lim_{x\to 0^+} f(x)$.

(A) $-1/6$

(B) 0

(C) $e^{-1/6}$

(D) $\ln(1/6)$

(E) 1

2. Suppose $\vec{a}$ and $\vec{b}$ are vectors in R^2 and further, that $\vec{a}$ and $\vec{b}$ are linearly independent.

Let $\vec{c} = \frac{\vec{a}\cdot\vec{b}}{\|\vec{a}\|}\vec{a} - \vec{b}.$

(A) $\vec{a}$ and $\vec{c}$ are linearly dependent.

(B) $\vec{a}$ and $\vec{c}$ are orthogonal.

(C) $\vec{b}$ and $\vec{c}$ are linearly dependent.

(D) $\vec{b}$ and $\vec{c}$ are orthogonal.

(E) $\{\vec{a}, \vec{b}, \vec{c}\}$ form a linearly independent set.

3. Let $A = \bigcap_{n=0}^{\infty} A_n$, where A_n are the intervals given by

$$\left(1 - \frac{1}{2^n}, 2 + \frac{1}{2^n}\right).$$

Then the set A is the interval

(A) $(1, 2)$

(B) $(1/2, 3/2)$

(C) $[1, 2]$

(D) $(0, 3)$

(E) None of the above

4. The sum of the infinite series $\sum_{n=1}^{\infty} \frac{1}{4n^2 - 1}$ is

(A) $\frac{1}{2}$

(B) $\frac{1}{4}$

(C) $\frac{3}{2}$

(D) $\frac{3}{4}$

(E) 1

5. Suppose $f(x) = \sum_{n=1}^{\infty} e^{-n \sin x}/n^2$. For what values of x does the series converge?

(A) $x > 0$

(B) $x \in (n\pi, (n+1)\pi), n = 0, \pm 1, \ldots$

(C) $x \in [n\pi, (n+1)\pi], n = 0, \pm 1, \ldots$

(D) $x \in (2n\pi, (2n+1)\pi), n = 0, \pm 1, \ldots$

(E) $x \in [2n\pi, (2n+1)\pi], n = 0, \pm 1, \ldots$

6. Let V_5 be the multiplicative group of invertible elements of Z_5. Let $v \in V_5$. How many roots does the equation $v^4 = \overline{1}$ have in V_5?

(A) 1

(B) 2

(C) 3

(D) 4

(E) 5

7. Suppose $u(x, y)$ is harmonic in a domain D and $v(x, y)$ is an harmonic conjugate of u. Let $f(z) = u(x, y) + iv(x, y)$. Which statements are true?

I. $g(z) = v - iu$ is analytic in D.

II. $f'(z) = u_x + iv_y$.

III. $v(x, y) + x - y$ satisfies Laplace's equation in D.

(A) I only

(B) II only

(C) III only

(D) I and II only

(E) I and III only

8. Let $f(x) = x^x$ with $0 < x < 1$. Determine the minimum value of f on the interval.

(A) 1/2

(B) $1/e$

(C) $1/\pi$

(D) 1/4

(E) 0

9. Which curve in Figure 1 cannot be a mapping of the unit circle $|z| = 1$ under the transformation $w = (az + b)/(cz + d)$ where a, b, c and d are real, and $ad - bc \neq 0$?

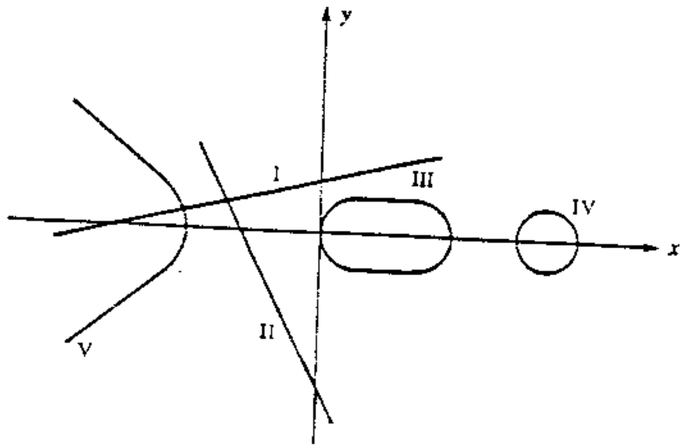


Figure 1:

(A) I only

(B) I and II only

(C) I, II, and III only

(D) III and V only

(E) IV only

10. Let $p(\lambda)$ be the characteristic polynomial for an $(n \times n)$ matrix A. Suppose that $\lambda = 0$ is a root of $p(\lambda)$. Which statements are always false?

I. A has n linearly independent eigenvectors.
II. $\det[p(A)] = 0$.
III. A is invertible.

(A) I only

(B) II only

(C) III

(D) I and II only

(E) I and III only

11. Determine the complex roots of the equation $e^{3z} + i = 0$.

(A) $(i/3)(-\pi/2 + 2n\pi)$, n an integer.

(B) $(i/3)(\pi/2 + 2n\pi)$, n an integer.

(C) $(i/3)(\pi/2 + n\pi)$, n an integer.

(D) $(i/2)(\pi/2 + 2n\pi)$, n an integer.

(E) $(i/3)(\pi + 2n\pi)$, n an integer.

12. Determine the Laurent series for $f(z) = 1/(z-2)$ which converges in the annulus $1 < |z-3| < \infty$.

(A) $\sum_{n=0}^{\infty} (z-3)^n$

(B) $\sum_{n=0}^{\infty} (z-3)^{-n}$

(C) $\sum_{n=0}^{\infty} (-1)^n (z-3)^{-n-1}$

(D) $\sum_{n=0}^{\infty} (-1)^n (z-3)^{-n}$

(E) $\sum_{n=1}^{\infty} (-1)^n (z-3)^{-n}$

13. Which of the following could be the equation for the curve in Figure 2?

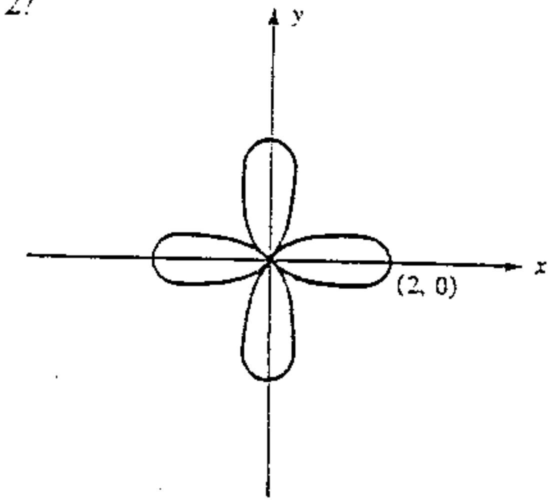


Figure 2:

(A) $r = 1 - 2\sin 2\theta$

(B) $r = 1 + 2\sin 2\theta$

(C) $r = 4\cos 2\theta$

(D) $r = 2\sin 4\theta$

(E) $r = 2\cos 4\theta$

14. Suppose $\phi'(x)$ exists and $\phi' \neq 0$ on $[\alpha, \beta]$. Further, suppose there exists a $\gamma \varepsilon [\alpha, \beta]$ such that $\phi(\gamma) = 0$. Let γ_0 in $[\alpha, \beta]$ be chosen arbitrarily. Let γ_1 be the point at which the tangent line to $\phi(x)$ at $(\gamma_0, \phi(\gamma_0))$ crosses the x-axis. For each $n \geq 0$, let γ_n be the x-intercept of the line tangent to ϕ at $(\gamma_{n-1}, \phi(\gamma_{n-1}))$. Which formula describes this method for approximateing the root of $\phi(x)$?

(A) $\gamma_{n+1} = \gamma_n - \phi''(\gamma_n)/\phi(\gamma_{n+1})$

(B) $\gamma_{n+1} = \gamma_n - \phi(\gamma_n)(\gamma_n - \gamma_{n-1})/(\phi(\gamma_n - \gamma_{n-1}))$

(C) $\gamma_{n+1} = \gamma_n + \phi(\gamma_n)/\phi'(\gamma_n)$

(D) $\gamma_{n+1} = \gamma_n - \phi'(\gamma_n)/\phi(\gamma_n)$

(E) $\gamma_{n+1} = \gamma_n - \phi(\gamma_n)/\phi'(\gamma_n)$

15. Let $P(S)$ denote the power set of any set S. Suppose $A = \{a, b, c\}$, $B = \{d, e\}$, and $C = P(A) \times B$. How many elements are in $P(C)$?

(A) 8

(B) 32

(C) 2^{10}

(D) 2^{16}

(E) 16

16. What is the indicial equation for the ordinary differential equation $x^2 y'' + 4xy' + 4y = 0$?

(A) $r^2 + 2r + 4$ (D) $r^2 + 3r + 4$

(B) $r^2 + 4r + 4$ (E) $r^2 + 4xr + 4$

(C) $r^2 + r + 1$

17. Which elements of the modular ring Z_9 are not invertible?

(A) $\bar{0}, \bar{3}, \bar{6}$ (D) $\bar{0}, \bar{2}$

(B) $\bar{0}, \bar{4}, \bar{8}$ (E) $\bar{0}, \bar{7}$

(C) $\bar{0}, \bar{3}$

18. A witness to a robbery told the police that the license number of the car contained three digits, the first of which was a 9, followed by three letters, the last of which was an A. The witness cannot remember the second and third digit, nor the first and second letter, but is positive that all the numbers were different and that the first two letters were the same, but different from the last letter. How many possible license plates match the description given by the witness?

(A) 1872 (D) 729

(B) 2600 (E) 1800

(C) 2106

19. A warm object is placed into a special refrigerator. The rate of change of the temperature of the object is proportional (with proportionality constant k) to the difference between its temperature and the ambient temperature in the refrigerator. Suppose the ambient temperature is 0 degrees, and further, that after one hour, the object's temperature is half its initial value. What is the value of k?

(A) ln 2 (D) 2

(B) 1/2 (E) None of the above

(C) e^2

20. Let G be a group with m elements g satisfying $g^2 = e$ where e is the group identity. How many elements of order 2 are there in G?

(A) $m + 1$ (D) 1

(B) m (E) None of the above

(C) $m - 1$

21. Which functions have unique fixed points on the stated intervals?

I. $f(x) = e^{-x}, x \in [1/3, 1]$

II. $g(x) = \pi + 1/2 \sin x, x \in [0, 2\pi]$

III. $h(x) = x^3 - 1, x \in [1, 2]$

(A) I only

(B) I and II only

(C) I, II, and III

(D) II and III

(E) None of the above

22. Let P and Q be logical propositions. Which of the following forms are tautologies?

I. $(P \vee Q) \wedge \neg (P \wedge Q)$
II. $(P \wedge \neg P) \Rightarrow Q$
III. $(P \vee Q) \Rightarrow \neg (Q \wedge P)$

(A) I and II only

(B) I and III only

(C) II and III only

(D) II

(E) III

23. In R^3, let $\alpha_1 = (1, 0, 1)$, $\alpha_2 = (0, 1, -2)$ and $\alpha_3 = (-1, -1, 0)$. If $f(\alpha)$ is a linear functional in R^3 such that $f(\alpha_1) = 1, f(\alpha_2) = -1$ and $f(\alpha_3) = 3$, and if $\alpha = (a, b, c)$, the $f(\alpha)$ can be expressed as

(A) $-4a - 7b + 3c$

(B) $4a - 7b - 3c$

(C) $3a - 6b - 3c$

(D) $3a - 6b - 2c$

(E) $4a - 7b + 3c$

24. Let $U = \{0, 1, c\}$ be a ring with three elements (1 is the unity). Which statements are true?

I. $1 + 1 + 1 = 0$
II. $1 + 1 = c$
III. $c^2 = 1$

(A) I only

(B) II only

(C) I and II only

(D) II and III only

(E) I, II, and III

25. Which equation describes the plane passing through the points $(2, -1, -2)$, $(-1, -2, -3)$, and $(4, 1, 0)$?

(A) $2x + y - 3z = 9$

(B) $x + 2y - 3z = 7$

(C) $3x + 2y - z = 5$

(D) $x + 2y + z = 9$

(E) $x + 2y - 3z = 11$

26. Let $\beta = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 3 & 1 & 2 & 5 & 4 \end{pmatrix}$ be an element of the symmetric group S_5. What is the order of β?

(A) 2

(B) 3

(C) 4

(D) 5

(E) 6

27. If $A = \begin{pmatrix} 3 & 1 \\ -1 & -1 \end{pmatrix}$ and $I = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$, which matrix polynomial vanishes?

(A) $A^2 - 2A - 4I$

(B) $A^2 - 2A + 4I$

(C) $A^2 + A + 2I$

(D) $A^2 - 2A - 2I$

(E) $A^2 - A + 2I$

28. Let the binary operation o be defined on all integers by $a \circ b = a + 2b + ab$. Which statemets are false?

I. o is associative.
II. o is commutative.
III. For every a, there is an inverse a^{-1} such that $a \circ a^{-1} = 1$.

(A) I only

(B) II only

(C) I and II only

(D) I, II, and III

(E) None of the above

29. A random variable X has mean μ, variance σ^2, and an unknown density function. Determine the constant c so that $P(|X - \mu| \geq c) \leq P_0$, where P_0 is a given constant probability.

(A) σ

(B) $\sigma/\sqrt{P_0}$

(C) $P_0\sigma$

(D) σ/P_0

(E) σ^2/P_0^2

30. A coin is biased so that a tail is twice as likely to occur as a head. What is the expected number of tails if the coin is tossed twice?

(A) 4/3

(B) 8/9

(C) 4/9

(D) 1/2

(E) 2

31. Which of the following matrices is orthogonal?

(A) $\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$

(B) $\begin{pmatrix} 1 & 2 \\ 0 & 1 \end{pmatrix}$

(C) $\begin{pmatrix} 1 & 0 \\ 1 & 0 \end{pmatrix}$

(D) $\begin{pmatrix} 2 & 1 \\ 0 & 1 \end{pmatrix}$

(E) $\begin{pmatrix} 1 & -1 \\ 1 & -1 \end{pmatrix}$

32. Evaluate $\lim_{x \to 0} \dfrac{\int_{-x}^{0} \sin t^3 \, dt}{x^4}$.

(A) $-1/2$

(B) $1/2$

(C) 1/4 (D) $-1/4$

(E) $\pi/2$

33. Which of the following subsets of $C[-1, 1]$ are not vector spaces?

(A) $\{f(x) \in C[-1, 1] : f(-1) = f(1)\}$

(B) $\{f(x) \in C[-1, 1] : f(x) = 0 \text{ if } x \in [-1/2, 1/2]\}$

(C) $\{f(x) \in C[-1, 1] : f(1) = 1\}$

(D) $\{f(x) \in C[-1, 1] : f(1) = 0\}$

(E) $\{f(x) \in C[-1, 1] : \int_{-1}^{1} f(x)\, dx = 0\}$

34. A real, symmetric matrix is called positive definite if $x^T Ax > 0$ for all x in R^n. Which of the following is positive definite?

(A) $\begin{pmatrix} 4 & 2 \\ 2 & 1 \end{pmatrix}$ (D) $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$

(B) $\begin{pmatrix} 0 & 1 \\ 1 & -1 \end{pmatrix}$ (E) $\begin{pmatrix} 1 & -2 \\ -2 & 0 \end{pmatrix}$

(C) $\begin{pmatrix} 2 & 0 \\ 0 & -2 \end{pmatrix}$

35. Let A and B be $n \times n$ symmetric matrices. Which of the following is a necessary and sufficient condition for AB to be symmetric?

(A) BA is skew-symmetric

(B) A and B are nonsingular

(C) $|AB| = |BA|$

(D) A and B commute

(E) B is Hermitian

36. Evaluate $\lim_{x \to \infty} \sqrt{x^2 + 2x} - x$.

(A) 0 (D) 2

(B) 1 (E) ∞

(C) $\sqrt{2}$

37. Let $f(x) = \sin^{-1} x + \cos^{-1} x$, where $-\pi/2 \le \sin^{-1} x \le \pi/2$ and $0 \le \cos^{-1} x \le \pi$. Which statements are true?

I. $f'(x) \le 0$ for all x
II. $f(1/2) = \pi/2$
III. $f(x)$ is an even function

(A) I only

(B) II only

(C) III only

(D) II and III only

(E) I, II, and III

Consider the following boundary value problem for $y(x)$:

$$d^2y/dx^2 + \lambda^2 y = 0,\ y(0) = 0,\ y'(1) = 0,$$

where $y' = dy/dx$ and λ is a parameter. For what values of *lambda* does this boundary value problem have nontrivial solutions?

(A) $n\pi,\ n = 1, 2, \ldots$

(B) $\pm n\pi,\ n = 1, 2, \ldots$

(C) $\frac{2n+1}{2}\pi,\ n = 0, 1, 2, \ldots$

(D) $\pm\frac{2n+1}{2}\pi,\ n = 0, 1, 2, \ldots$

(E) $\frac{2n-1}{2}\pi,\ n = 0, 1, 2, \ldots$

If $f(x)$ is everywhere differentiable on the closed interval $[a, b]$, then

(A) $f'(x)$ is Riuemann integrable

(B) $f''(x)$ exists

(C) $f'(x)$ is continuous

(D) $f(x)$ may be unbounded

(E) $f(x)$ is uniformly continuous on the interval

40. Which function is not periodic?

(A) $\sin(e^{\sin x})$

(B) $\tan h[\cos(\sin x)]$

(C) $\sqrt{\left|\tan\left(\frac{1}{2}\cos x\right)\right|}$

(D) $\cos[\cos(e^x)]$

(E) $\ln[1/(2 + \cos x)]$

41. Let $a_n = \left(\frac{n+2}{n+1}\right)^{2n+3}$. Determine $\lim_{n\to\infty} a_n$.

(A) 1

(B) e

(C) e^2

(D) e^3

(E) 0

42. Determine the maximum value of $|A|$ where

$$A = \begin{pmatrix} 1 & 1 & x \\ 1 & -1 & x^2 \\ -1 & 0 & 1 \end{pmatrix}$$

(A) $-5/4$

(B) $-1/2$

(C) 0

(D) 1/2

(E) 3/4

43. Consider the flow of heat in a thin, uniform bar of length L. The temperature distribution $u(x, t)$ in the bar obeys the partial differential equation

$$u_t = ku_{xx},$$

where k is a constant. Suppose the temperature of the bar at $x = 0$ is fixed at 0 degrees, while the temperature at $x = L$ is fixed at 1 degree. At time $t = 0$, the temperature distribution is $u(x, 0) = f(x)$. What is the average temperature in the bar in the limit as $t \to \infty$?

(A) 0

(B) $\frac{1}{10}\int_0^L f(x)\,dx$

(C) 5

(D) 10

(E) $\sum_{n=1}^{\infty} A_n \cos(n\pi x/L)\exp(-kn^2\pi^2 t/L)$

44. The differential equation

$$dP/dt = P(1-P)(P-2),$$

possesses the three equilibrium solutions $P_1 = 0$, $P_2 = 1$, and $P_3 = 2$. Which of these are stable?

(A) P_1 and P_2 only

(B) P_2 and P_3 only

(C) P_1 only

(D) P_2 only

(E) P_3 only

45. Let $f(z) = 1/(z^2+1)$. Evaluate $\oint_\Gamma f(z)\,dz$ where Γ is the curve shown in Figure 3.

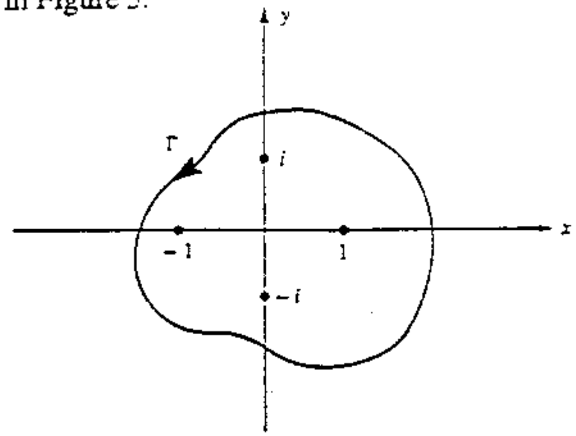


Figure 3:

(A) 0

(B) π

(C) πi

(D) 2π

(E) $2\pi i$

46. Determine an harmonic conjugate $v(x, y)$ for the harmonic function $u(x, y) = y + 3xy^2 - x^3$.

(A) $-y + 3xy^2 - x^3$

(B) $x + 3xy^2 - x^3$

(C) $y^3 - 3x^2y - x$

(D) $y^3 - 3x^2y + x$

(E) $y^3 - 3x^2y + x$

47. Let $A = \begin{pmatrix} 2 & 1 \\ -1 & x \end{pmatrix}$. For what values of x does A possess a repeated eigenvalue?

(A) $\{0, 4\}$

(D) $\{1, 3\}$

(B) $\{0, 3\}$

(E) $\{1, 2\}$

(C) $\{1, 4\}$

48. Consider the sequence $a_{n+1} = \sqrt{b + a_n}$ where $a_1 = 1$. What is the smallest positive value of b such that b is divisible by 7 and that the limit of the sequence is an integer?

(A) 7

(D) 84

(B) 42

(E) 98

(C) 49

49. What is the volume of the body of revolution formed by rotating the curve $y = e^{-x}$, $0 \le x \le \infty$ about the x–axis?

(A) $\pi/2$

(B) 1/2

(C) π

(D) 1

(E) 2π

50. Suppose $\int_0^\infty f(x)\,dx$ exists. Which statements are false?

I. $\lim_{x\to\infty} f(x) = 0$

II. $\int_0^\infty |f(x)|\,dx$ exists

III. $\int_0^\infty [f(x)]^2\,dx$ exists

(A) I only

(D) II and III only

(B) II only

(E) I, II, and III

(C) I and II only

51. Suppose $f(z)$ is a nonconstant entire function. Which statement is always true?

(A) $\lim_{z\to\infty} f(z) = 0$

(B) $\lim_{z\to 0} f(z) = 0$

(C) $f'(z)$ may not be entire

(D) $\oint f(z)\,dz = 2\pi i$ for every simple closed curve in the complex plane

(E) None of the above

52. If $y = x$ is a solution of the differential equation

$$y'' + xy - y = 0,$$

another, linearly-independent solution is given by

(A) x^2

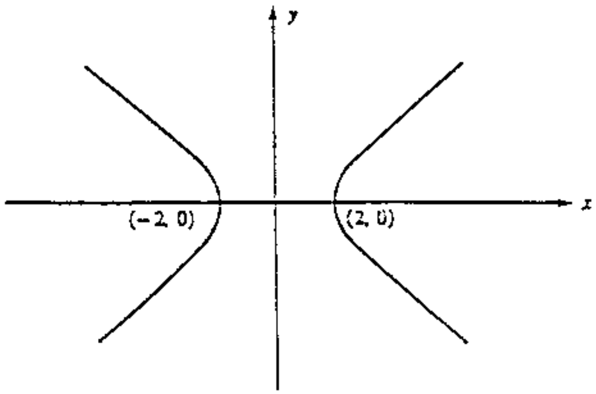
(B) $x^2 \int^x e^{-t^2}/t^2\,dt$

(C) $x \int^x e^{-t^2}/t^2\,dt$

(D) $x \int^x e^{-t^2}\,dt$

(E) $x \int^x e^{-t^2}/t^2\,dt$

53. Which of the following could be the equation for the curve shown in Figure 4?



(A) $x^2/4 + y^2 = 1$

(B) $x^2/2 - y^2 = 1$

(C) $x^2/2 + y^2 = 1$

(D) $y^2 - x^2/2 = 1$

(E) $x^2/4 - y^2 = 1$

54. If $z = i^i$, then z can assume the real value

(A) -1

(B) 1

(C) $e^{3\pi/2}$

(D) $e^{2\pi}$

(E) $\pi/2$

55. Let $f(x)$ be a real-valued function defined on $[a, b]$. Which of the following conditions is not sufficient to ensure that $\int_a^b f(x)\,dx$ exists?

(A) $f(x)$ is monotonic

(B) $f(x)$ is continuous

(C) $f(x)$ is bounded and piecewise smooth

(D) $f(x)$ has only a finite number of discontinuities

(E) None of the above

Let $f(x)$ be a function defined for all real x such that the coordinates of each point of its graph satisfy $|y| = x^2$. The total number of points at which $f(x)$ must be differentiable is

(A) none (D) 4

(B) 1 (E) infinite

(C) 2

Let $f(x) = x^{1/\ln x}$, $x > 0$, and $x \neq 1$. If $f(x)$ is continuous at $x = 1$, then $f(1)$ is

(A) 0 (D) e

(B) 1 (E) 4

(C) 2

The series $\sum_{n=2}^{\infty} \frac{(x+2)^n}{n^3 3^{n+1}}$ has the inverval of convergence

(A) $-3 < x < 3$ (D) $-5 \leq x \leq 1$

(B) $-3 \leq x \leq 3$ (E) $-5 \leq x \leq 3$

(C) $-5 \leq x < 1$

For the algorithm described below, what is the complete output sequence if the input value is 13?

```
procedure test;
variable x : real;
begin(test)
   input(x);
   repeat
      if x mod 2 = 0 then x := x/2
        else x := 3 * x + 1;
      output(x);
   until x = 1;
end.(test)
```

(A) 13, 40, 20, 10, 5, 16, 8, 4, 2, 1

(B) 13, 40, 20, 10, 5, 1

(C) 40, 20, 10, 5, 18, 8, 4, 2, 1

(D) 13, 39, 40, 20, 10, 5, 1

(E) 40, 20, 10, 5, 20, 10, 8, 4, 2, 1

60. Which of the following sets in R^2 are compact?

(A) $\{x, y \mid x \geq 0, y \geq 0\}$

(B) $\{x, y \mid 1 \leq x \leq 2, 0 \leq y \leq 1\}$

(C) $\{x, y \mid 1 \leq x \leq 2, y = 0\}$

(D) $\{x, y \mid x^2 + y^2 \leq 2\} \cap \{x, y \mid x^2 + y^2 > 1\}$

(E) $\{x, y \mid |x + y| < 1\}$

61. If $6x + 5y$ is a multiple of 13, what must b be so that $8x + by$ is also a multiple of 13?

(A) 0
(B) 5
(C) 7
(D) 9
(E) 11

62. Which statements about fields are always true?

I. Every field contains at least one finite subfield.
II. The transcendental real numbers form a field.
III. Every field is an integral domain.

(A) I only
(B) II only
(C) III only
(D) I and II
(E) I and III

63. Inside the registers of a microprocessor, two numbers are ANDed by forming the logical AND of their respective binary digits. What is the result of ANDing 27 and 52?

(A) 16
(B) 22
(C) 63
(D) 79
(E) 127

64. Which of the following could be a density function of a continuous random variable X?

(A) $f(x) = \dfrac{1}{1 + x^2}$

(B) $f(x) = \begin{cases} 0, & x < 0 \\ 2e^{-2x}, & x \geq 0 \end{cases}$

(C) $f(x) = \begin{cases} 0, & x < 1 \\ 1, & 1 \leq x \leq 2 \\ 0, & x > 2 \end{cases}$

(D) $f(x) = \begin{cases} 0, & x < 2 \\ 1/x^2, & x \geq 2 \end{cases}$

(E) $f(x) = \begin{cases} 0, & x \text{ rational} \\ 1, & x \text{ irrational} \end{cases}$

65. Which of the following is the contrapositive of the statement $P \wedge Q \Rightarrow \neg R \wedge S$?

(A) $\neg R \wedge S \Rightarrow P \wedge Q$
(B) $P \wedge Q \Rightarrow R \vee \neg S$

(C) $R \vee \neg S \Rightarrow \neg P \vee \neg Q$

(D) $\neg P \vee \neg Q \Rightarrow R \vee \neg S$

(E) $P \vee Q \Rightarrow \neg R \vee S$

Suppose $A = \begin{pmatrix} 5 & -2 \\ 6 & -2 \end{pmatrix}$. Which matrix below can be used to diagonalize A?

(A) $\begin{pmatrix} 2 & 1 \\ 3 & 2 \end{pmatrix}$

(B) $\begin{pmatrix} 6 & -2 \\ 5 & -2 \end{pmatrix}$

(C) $\begin{pmatrix} 2 & 0 \\ 0 & 1 \end{pmatrix}$

(D) $\begin{pmatrix} 1 & 0 \\ 0 & 2 \end{pmatrix}$

(E) $\begin{pmatrix} 2 & 3 \\ 1 & 2 \end{pmatrix}$

GRE MATHEMATICS
TEST VI

ANSWER KEY

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