LIMITS , CONTINUITY AND GRAPH THEORY

1. $\lim_{x\to 1} \frac{x^3-2x^2-x+2}{(x^2+x-2)}$ is

   a) 1 b. 2/3 c. – 2/3 d. 3/2

2. $\lim_{x\to 3} [\frac{1}{x-3} - \frac{3}{x(x^2-5x+6)}]$ is

   a. 0 b. ¾ c. 4/3 d. - 4/3

3. $\lim_{x\to 0} \frac{1}{x} \sin^{-1}\left(\frac{2x}{1+x^2}\right)$ is

   a. – 2 b. 2 c 0 d. ∞

4. $\lim_{x\to 0} \frac{1-\cos 4x}{\cos 6x-\cos 4x}$ =

   a. 4/5 b. – 4/5 c. 1 d. 8/5

5. The least integer n for which

   $\lim_{x\to 0} \frac{e^x-\sin x-\cos x}{x^n}$ is finite and non zero is

   a. 0 b. 1 c. 2 d . 3

6. $\lim_{\theta\to 0} \frac{\sin^2\theta \cdot \tan 4\theta}{\tan 2\theta^2 \sin 3\theta}$ is

   a. 2/3 b. 4/3 c. 3/4 d. 3/2

7. $\lim_{x\to 2} \frac{\sqrt{2x^2-1}-\sqrt{3x+1}}{\sqrt{x^3+1}-\sqrt{2x+5}}$ is

a. $3/\sqrt{7}$ b. $2\sqrt{7}$ c. $3/2\sqrt{7}$ d. $3/4\sqrt{7}$

8. $\lim_{n\to 0^+} \frac{1^2+2^2+3^2+\cdots\cdots\cdots+n^2}{2n^3+3n^2+5}$ *is*

a. 1/ 12 b. 1/6 c. 2/3 d. 1/30

9. $\lim_{n\to\infty} [(2^n+1)(7^n+10^n)]^{\frac{1}{n}}$

a. 10/3 b. 10 c. 20 d. 30

10. $\lim_{x\to\infty} \sqrt{x}(\sqrt{2x+1}-\sqrt{2x-1})$ is

a. $2\sqrt{2}$ b. $\sqrt{2}$ c. $1/\sqrt{2}$ d. $-1/\sqrt{2}$

11. $\lim_{x\to\infty} \left(\frac{x+4}{x+2}\right)^x$ is

a) e^2 b) e^6 c) e^3 d) 0

12. $\lim_{x\to 1} \left(\frac{1+x}{2+x}\right)^{\frac{1-\sqrt{x}}{1-x}}$ is

a. $\sqrt{2/3}$ b. 2/3 c. 4/9 d. 8/27

13. $\lim_{x\to 0^+} \frac{a^{\tan x}-a^{\sin x}}{\tan x-\sin x}$ is

a. log a b. – log a c. tan x d. 1

14. The value of f(0) , so that the function f (x) = $\frac{2x - \sin^{-1} x}{2x + \tan^{-1} x}$

is continuous at each point in its domain, is

a.– 1/3 b. 0 c. 1/3 d. 3

15. If function f(x) = $\begin{cases} \frac{1-\cos 4x}{x^2} & for \ x < 0 \\ m \quad for \ x = 0 \\ \frac{\sqrt{x}}{\sqrt{16+\sqrt{x}}-4} & for \ x > 0 \end{cases}$

Is continuous at x = 0 then the value of m is

a. 0 b. 2 c. 4 d. 8

16. if f (x) = $\begin{cases} \frac{|x|}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$

Then which of the following is true.

a. Left hand limit = Right hand limit b. Limit does not exist

c. f(x) is continuous at x = 0 d. f(x) is differentiable at x = 0

17. The function f(X) = $\begin{cases} 2x - 1 & if \ x < -1 \\ 3x^2 + 1 & if \ -1 \leq x < 3 \\ x^3 + 1 & if \ 3 \leq x < 4 \end{cases}$ Is discontinuous at

a. -1 b. 3 c. -1, 3 d. none of these

18. If f(x) = $\begin{cases} \frac{x\, e^{\frac{1}{x}}}{1+e^{\frac{1}{x}}} & x \neq 0 \\ \frac{k}{2} & x = 0 \end{cases}$

Is continuous at x = 0 then the value of k is

a.-1 b. 2 c. 0 d. 1

19. Which of the following is true always

a. If f(x) is continuous at x = a then it is differentiable at x = a

b. If f(x) and g(x) are continuous at x = a
Then(f(x) – g(x)) need not be continuous at x=a

c. Every polynomial function is continuous in the region (- ∞, ∞)

d. None of these.

20. Let f(x) = $[x] + [-x]$ where [ ] denotes greatest integer part then for any integer m

a. f(x) is continuous at x = m

b. $\lim_{x \to m} f(x)$ exists but ≠ f (m)

c. $\lim_{x \to m} f(x)$ does not exists

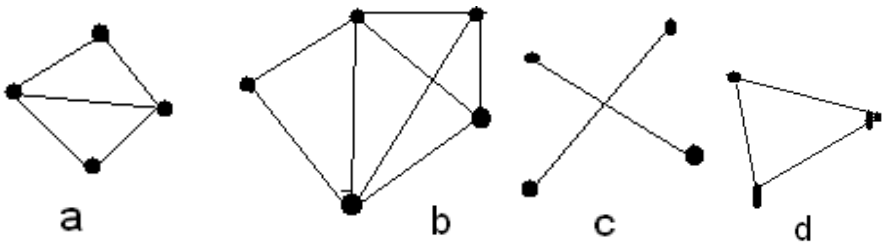
d. f (x) is differentiable at x = m

21. If f(x)=$\begin{cases} \frac{\sqrt{1+mx}-\sqrt{1-mx}}{x}, & -1 \leq x < 0 \\ \frac{2x-1}{x-2}, & 0 < x \leq 1 \end{cases}$ is continuous in [-1 1]

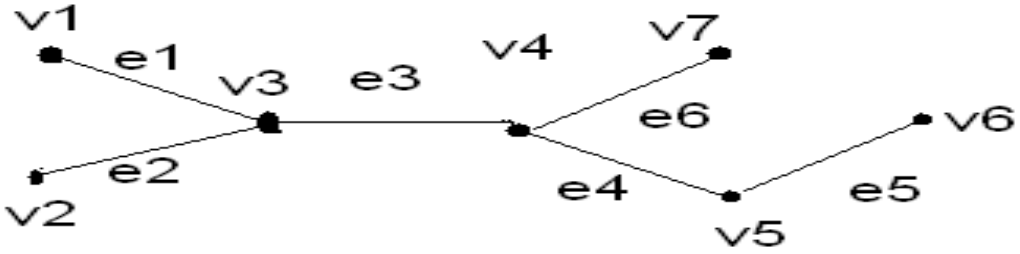
Then the value of m is

a. 2 b. ½ c. – ½ d. -2

22. Which of the following is an Euler graph?

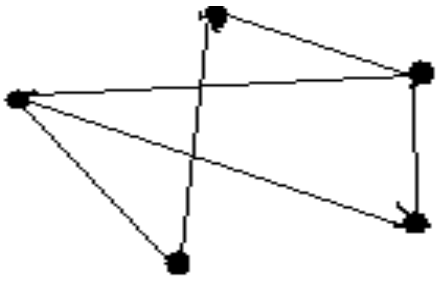


23. If **m** is the number of cut vertices and **n** is the number of bridges in a given graph then **m+n** is

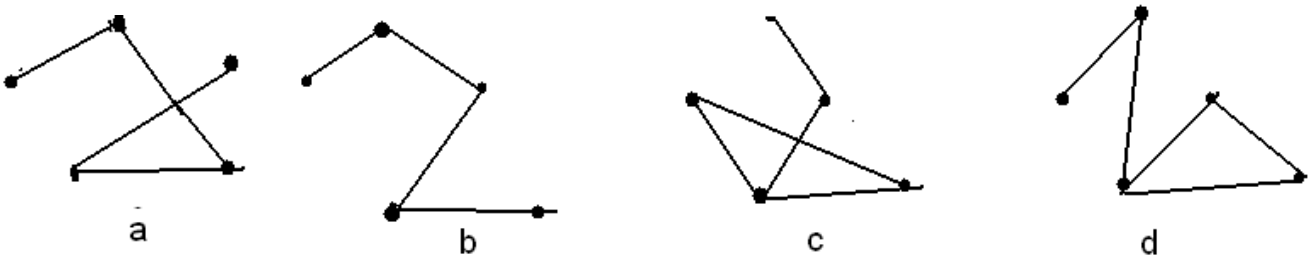


a. 11 b. 6 c. 7 d. 9

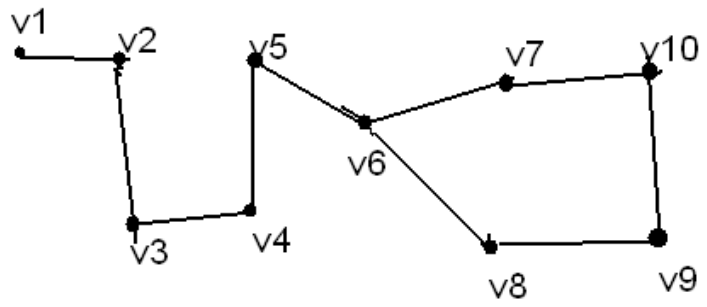
24. The compliment of the given graph



is



25. The length of longest cycle and longest path for a given graph



a) (5,10) b)(6,10) c) (5,9) d) (6,8)

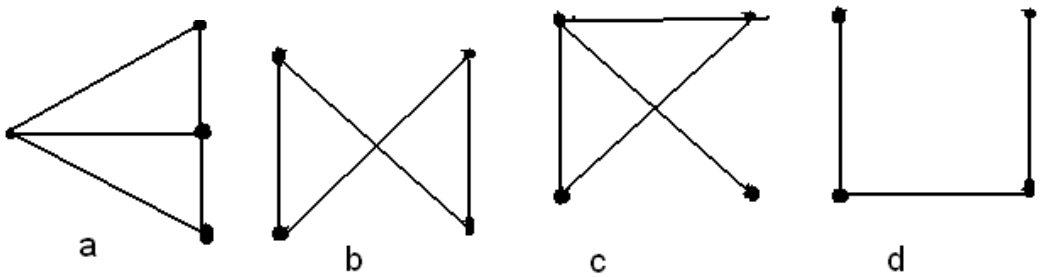
26. If sum of the degrees of all Vertices of a graph **G** is 24, then the number of edges in that graph is

a. 23. b. 10 c. 6 d. 12

27. The number of edges in a complete graph of **'n'** vertices is

a. n b. n(n-1) c. $\frac{n(n-1)}{2}$ d. n/2

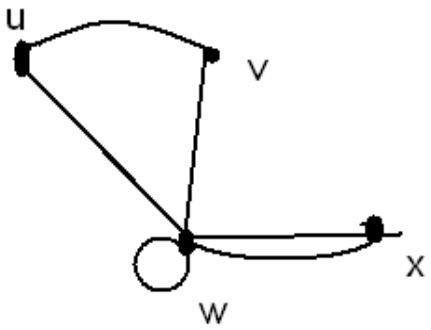
28. Which of the following is a bipartite graph ?



29. If F, V, E denote faces ,vertices, and edges of polyhedron respectively then Euler's formula is

a. F+E = V+2
b. F+V = E+2
c. V+E = F+2
d. F+V = 2 E

30.



In the above graph degree of w is

a.4 b. 5 c. 6 d. 7

31. A graph is called psuedograph if

a. It has no loops and no multiple edges.
b. It has multiple edges and no loops.
c. It has both multiple edges and loops.
d. It is **a** tree.

32. An isolated vertex is

a. Not a cut vertex.
b. A cut vertex.
c. A complete graph.
d. Of degree one

33. If f (a) = 3 , g (a) = 2 , f ' (a) = 1 and g ' (a) = - 1

Then $\lim_{x \to a} \frac{f(x)g(a) - f(a)g(x)}{x-a}$ is

a.0 b. 5 c. – 5 d . 6

34. $\lim_{x \to 1} \frac{\sum_{m=1}^{100} x^m - 1}{x-1}$ is

a)1050 b) 5050 c) 1010 d) 5010

35. $\lim_{x \to \frac{\pi}{3}} \frac{tan^3 x - 3tanx}{\cos(x+\frac{\pi}{6})}$ is

a.12 b)24 c)-12 d)-24

36. $\lim_{x \to 1} \frac{x^{\frac{1}{2}} + x^{\frac{1}{4}} - 2}{x^3 - 1}$ is

a. 7/36
b. + 1/36
c. – 1/12
d. 7/12

37. $\lim_{n\to\infty} \frac{2^{-n}(n^2+5n+6)}{(n+5)(2n-1)}$ is

a. 0

b. 1

c. ∞

d. - 2

38. $\lim_{\theta\to\frac{\pi}{4}} \frac{\sqrt{2}-cos\theta-sin\theta}{(4\theta-\pi)^2}$ is

a. 1/32

b. 1/16

c. $\frac{\sqrt{2}}{16}$

d. $\frac{\sqrt{2}}{32}$

39. $\lim_{x\to 0} \frac{e^x-e^{xcosx}}{x+sinx}$ is

a. 0

b. 1

c. 2

d.- 1

40. $\lim_{x\to 0} \left(\frac{1-tanx}{1-sinx}\right)^{cosecx}$ is

a. 0

b. 1

c. e

d. 1/e

41. $\lim_{x\to 0^+} \frac{\sin\sqrt{x}}{\sqrt[4]{x}}$ is

a. 1
b. 0
c. – 1
d. – ¼

42. $\lim_{n\to\infty} \frac{3(2)^{n+1} - 4(5)^{n+1}}{5(2)^n + 8(5)^n}$ is

a. – 5/2
b. 5/2
c. 10
d. – ¼

43. $\lim_{x\to 0} \frac{(5)^x + (5)^{-x} - 2}{(x)^2}$ is

a. 2log5
b. $(log5)^2$
c. 0
d. 1

44. $\lim_{n\to\infty} \left[\frac{1}{1-n^2} + \frac{2}{1-n^2} + \frac{3}{1-n^2} + \cdots + \frac{n}{1-n^2}\right]$ is

a)0 b)4 c)1/2 d)-1/2

45. $\lim_{x\to 0} \frac{2^x + 3^x - 5^x - 7^x}{\tan x}$ is

a) $\log_e 6/5$ b) $\log_e 6/35$ c) $\log_e 5/6$ d) $\log_e 6/15$

46. $\lim_{x\to\infty} \frac{(x)^n}{(e)^x}$ $for\ all\ n \in N$ is

a. e

b. n!

c. 0

d.1/e

47. $\lim_{x\to\infty} \left(\frac{x+5}{x+2}\right)^{2x+1}$ is

a. e^4

b. e^{-4}

c. e^6

d. e^2

48. $\lim_{\theta\to\frac{\pi}{6}} \frac{2\sin^2\theta+\sin\theta-1}{2\sin^2\theta-3\sin\theta+1}$ is

a)0 b)-1 c)1 d)-3

49. $\lim_{x\to1}\left(\frac{3}{1-x^3}-\frac{5}{1-x^5}\right)$ is

a)0 b)1 c)-1 d)3

50. $\lim_{x\to\infty} \frac{(2x+3)^{10}(4x-1)^{10}}{(2x-5)^{50}}$ is

a)1 b) 2^{10} c) 2^5 d) 2^2

51. $\lim_{n\to\infty} \left(\frac{1+3+5+\cdots \text{ } +n \text{ terms}}{2+4+6+\cdots.+n \text{ terms}}\right)^n$ is

a) 1 b) 2 c) 1/e d) e

52. $\lim_{x\to 0} \frac{\tan\sqrt[3]{x}.\log(1+3x)}{(\tan^{-1}\sqrt{x})^2\,(e^{\sqrt[3]{x}}-1)}$ is

a. ½ b. 3 c.0 d.1/3

53. $\lim_{\theta\to 0} \frac{\sin\theta^2(1-\cos\theta^2)}{\theta^6}$ is

a. 1/2 b.1/4 c.0 d.1/3

54. $\lim_{x\to\frac{\pi}{4}} \frac{1-\cot x}{2-\operatorname{cosec}^2 x}$ is

a. -½ b. 1 c.1/4 d.1/2

55. If f(x) $= \begin{cases} \frac{x^2-c^2\,x+\,2c}{2x^2\,-5x\,+\,2} & x \neq 2 \\ 1 & x = 2 \end{cases}$

Is continuous at x = 2 then the value of c

a. ± 1 b. 1 c. – 1 d. 0

56. The function f(x) = [x] + $|1 - x|$ where [x] greatest integer x is

a. Continuous at x = 1
b. Dis continuous at x = 1
c. Limit as x --->1 does not exist
d. Derivable at x = 1

57. If f (x) = $\begin{cases} \frac{\sin 3x}{x^3+4x} & x \neq \\ \frac{k}{2} & x = 0 \end{cases}$

Is continuous at x = 0 then value of k is

a. ¾ b. 4/3 c. 3/2 d. 2/3

58. Which of the following is false statement

a. If f(x) is continuous at x = a then $\lim_{x \to a}$ f(x) exists.
b. If f' (a) exists then f(x) is continuous at x = a
c. If f(x) is continuous at x = a the f'(a) exists
d. If $\lim_{x \to a}$ f(x) = f(a) f(x) is continuous at x = a

59. The function f(x) = $\frac{1-\sin x+\cos x}{1+\sin x+\cos x}$ is not defined at x = Π The value of f(Π) so that f(x) is continuous at x = Π is

a. – ½ b. ½ c. -1 d. 1

60. If f(x)=$\begin{cases} \frac{\sin(e^{x-2}-1)}{\log(x-1)} & when\ x \neq 2 \end{cases}$ is continuous at x=2 then f(2) is

a)e b)e^2 c)-e d)1

61. If f(x)=$\begin{cases} \frac{\log_e(1+2x)-\log_e(1-2x)}{x} & if x \neq 0 \\ e^n & if\ x = 0 \end{cases}$

is continuous at x=0.then the value of n is

a) 4 b)e^4 c) $\log_e 4$ d) $\log_4 e$

62. If f(x) =$\begin{cases} \frac{sin[x]}{[x]} & [x] \neq 0 \\ 0 & [x] = 0 \end{cases}$

where [ ] denotes greatest integer part

$\lim_{x \to 0}$ f(x) is equal to

a) 1 b)-1 c)0 d)none of these

63. Which of the following is a False statement?

a)In a graph, every edge of a tree is abridge .

b)In a graph Edge set E can be an empty set .

c)Every graph must have even number of vertices of odd degree.

d)In any tree there must be at least one pendent vertex.

64. In a complete K_n regular graph the degree of each vertex is

a)n(n-1)/2 b)n/2 c)n-1 d)n

65. The number of edges and vertices of K_5 graph is

a) 15, 5

b) 15 , 4

c) 10 , 4

d) 10, 5

66. The point of discontinuity of the function

f(x) $= \lim_{n\to\infty}\left(\frac{4^n(\sin^2 x)^n}{3^n-(4\cos^2 x)^n}\right)$ is

a) $n\pi \pm \frac{\pi}{3}$ b) $n\pi \pm \frac{\pi}{6}$ c) $n\pi \pm \frac{5\pi}{6}$ d) $n\pi \pm \frac{2\pi}{3}$

67. $\lim_{x\to 0}\left[\frac{|\sin x|+|\sin^2 x|+|\sin^3 x|\ldots\infty}{x}\right]$ is

a)1 b)0 c)2 d)-1

68. $\lim_{x\to 0}\frac{x\tan 2x-2x\tan x}{(1-\cos 2x)^2}$ is

a)2 b)-2 c)1/2 -d)-1/2

69. $\lim_{x\to 0}\left[\frac{e^{\frac{1}{x}}-1}{(1+e^{\frac{1}{x}})}\right]$ is

a) 1 b)0 c)does no exists d)none of these

70. $\lim_{n\to\infty}\left[1-\frac{2}{3}+\frac{4}{9}-\frac{8}{27}+\cdots n\ terms\right]$ is

a)2/3 b)3/5 c)-3/5 d)5/3