LEVEL (MATHALALY BLITZ 004

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7. The single logarithm of $\log_a 7 + 4\log_a 3$ is:

a) $\log_a 14$ b) $\log_a 567$ c) $\log_a 19$ d) $\log_a 310$

e) none of these

8. The simplified expression $\sqrt{6-2\sqrt{5}}$ is :

a) $3+\sqrt{5}$ b) $\sqrt{6}+\sqrt{10}$ c) $\sqrt{5}-1$ d) $1-\sqrt{5}$

e) none of these

9.If $f(x)=\sqrt{x}$ and $g(x)=\sqrt{2x}$, then $f(g(x))=$

a) $x\sqrt{2}$ b) $\sqrt{2\sqrt{x}}$ c) $\sqrt[4]{2x}$ d) $\sqrt{2}$ e) none of these

10. The solution to $|3-2x|-3<8$ is:

a) $(-4,7)$ b) $(-4,4)$ c) $(-4,\infty)$ d) $(-\infty,4)$ e) none of these

1. If the graph of f(x) is symmetric with respect to y-axis and the graph of g(x) is symmetric with respect to the origin (0,0), then the graph of $(g \circ f)(x)$ is symmetric with respect to:

a) origin (0,0) b) y-axis c) x-axis d) line y = x

e) none of these

12. The distance between the lines $l_1 : y = 3x + 4$ and $l_2 : y = 3x - 1$ is:

a) 3 b) 5 c) $\frac{\sqrt{10}}{2}$ d) $\sqrt{2}$ e) none of these

13. For the equation $x^2 + kx + 54 = 0$, one solution is twice the other solution. The possible value(s) of k is (are):

a) $\pm 9\sqrt{3}$ b) $-3\sqrt{3}$ c) 22 d) 54 e) none of these

14. The value of $\cos^2(-240^\circ)-\sin^2(-240^\circ)$ is:

a) 1 b) -1 c) $\frac{1}{2}$ d) $-\frac{1}{2}$ e) none of these

15. The lengths of the three sides of a triangle are 30 meters, 20 meters, and 14 meters. The area (in square meters) of the triangle is:

a) $48\sqrt{6}$ b) $160\sqrt{77}$ c) 300 d) $20\sqrt{42}$ e) none of these

16. The value of i^{1051} (where $i=\sqrt{-1}$) is

a) 1 b) -1 c) i d) $-i$ e) none of these

17. If P has rectangular coordinates $(3,-\sqrt{3})$, then P has polar coordinates:

a) $(2\sqrt{3},\frac{5\pi}{6})$ b) $(2\sqrt{3},\frac{11\pi}{6})$ c) $(2\sqrt{3},\frac{2\pi}{3})$ d) $(2\sqrt{3},\frac{4\pi}{3})$

e) none of these

18. The solution of the logarithmic equation $\ln(\ln(\ln x))=0$ is:

a)0 b)1 c) e d) e^e e) none of these

19. The polar equation $r=\frac{15}{3-2\cos\theta}$ describes:

a) a parabola b) an ellipse c) a hyperbola d) a circle

e) none of these

20. If D_f and D_g are domains of functions f(x) and g(x), respectively, then the domain of $(f\circ g)(x)$ is:

a) D_f b) D_g c) $D_f\cup D_g$ d) $D_f\cap D_g$ e) none of these

21. The solution set to $\frac{3}{x+1}\geq\frac{2}{x-2}$ is:

a) $[8,\infty)$ b) $(-1,2)\cup[8,\infty)$ c) $(-\infty,2)$

d) $(-\infty,-1)\cup(2,8]$ e) none of these

22. The slope of a line perpendicular to the line $3x-7y+4=0$ is:

b) $\frac{3}{7}$ c) $\frac{7}{3}$ d) $-\frac{7}{3}$ e) none of these

23. If $f(x)=[[x]]$, where $[[x]]$ is the largest integer less than or equal to x, then $f(-1.5)+f(1.5)=$

b) 0 c) 1 d) 4 e) none of these

24. If f(x) and g(x) are odd functions, and h(x) is an even function, which of the following is <u>not</u> an even function:

a) $\frac{1}{3}[f(x)\cdot g(x)]$ b) $f^2(x)[h(x)-2]$ c) $[g(x)+1]^2$

d) $[f(x)+g(x)]^2$ e) none of these

25. If $f(x)=\log_2 x$, then $f\left(f(\sqrt[16]{16})\right)=$

a) 0 b) $\frac{1}{4}$ c) -2 d) -4 e) none of these

26. How may times does the graph of $y=4\cos(3x-\frac{\pi}{2})$ cross the x-axis for x in the interval $[0,2\pi]$?

a) 4 b) 5 c) 6 d) 7 e) none of these

27. Find the value of $\sin(-23^\circ)$ if $\sin 41^\circ=$ a, $\cos 41^\circ=$ b, $\sin 18^\circ=c$, and $\cos 18^\circ=d$:

a) $bc-ad$ b) $ad-bc$ c) $ac-bd$ d) $bd+ac$

e) none of these

28. Which of the following is an asymptote of the graph of $y=\frac{2x}{3-7x}$

a) $y=\frac{2}{3}$ b) y = 0 c) $y=-\frac{2}{7}$ d) y = 1

e) none of these

29. The polar equation $r = 3\sin 2\theta$ describes:

a) lemniscate b) spiral c) limacon d) rose curve

e) none of these

30. The number of positive real zeros of the polynomial $f(x) = -(3x-1)(x^2+2x-5)+3$ is:

a) 0 b) 1 c) 2 d) 3 e) none of these

31. The maximum value of the function $y = -3x^2 + 5x - 2$ is:

a) $\frac{5}{3}$ b) $-\frac{5}{3}$ c) $\frac{1}{12}$ d) $-\frac{1}{12}$ e) none of these

32. In a circle of radius 18 miles, a sector has an interior angle of 10°. The length of the arc of the sector (in miles) is:

a) 180 b) $\frac{129600}{17}$ c) π d) e) none of these

33. What is the linear velocity in inches per second of a tip of a 20-inch lawnmower blade that is rotating at 3000 revolutions per minute?

a) 600 b) 1000π c) 1000 d) 300π e) none of these

34. The number of solutions to $\cos^4 x - \sin^4 x = \sin 2x$ in the interval $[\pi, 2\pi]$ is:

a) 1 b) 2 c) 3 d) 4 e) none of these

35. If $y = \sqrt{e^{3-2x}}$, then x =

a) $\frac{3}{2} - \ln y$ b) $\ln\sqrt{3-2y}$ c) $\sqrt{e^{3-2y}}$ d) $\left(e^{3-2y}\right)^2$

e) none of these

36. If $2\log_a x = \log_b x^2$ for some $x \neq 1$, then the following must be true:

a) $a = b$ b) $a^2 = b$ c) $a = b^2$ d) $2a = b$

e) none of these

37.The shortest distance between point $P(3,3)$ and the circle $x^2+y^2=4$ is:

a) 1 b) 2 c) $3\sqrt{2}$ d) $3\sqrt{2}-2$ e) none of these

38.The oblique asymptote(s), if any, of the graph of the function

$$f(x)=\frac{2x^3+16x^2+39x+29}{x^2+5x+4}$$ is:

a) $y=0$ b) $y=2x$ c) $y=2x+6$ d) $y=2x-6$

e) none of these

39. $\tan\left(\arccos\frac{\sqrt{3}}{2}\right)=$

a) $-\frac{\sqrt{3}}{3}$ b) $\frac{\sqrt{3}}{2}$ c) $\frac{\sqrt{3}}{3}$ d) $\sqrt{3}$ e) none of these

40. If $S=\frac{1}{1001}+\frac{1}{1002}+\frac{1}{1003}+....+\frac{1}{10{,}000}$, then which of the following must be true ?

a) $S<.09$ b) $.09<S<$ c) $.1<S<.9$ d) $.9<S<9$

e) none of these

41. The roots of the equation $f(x)=0$ are and -2. The roots of $f(2x)=0$ are:

a) 1 and -2 b) $\frac{1}{2}$ and -1 c) $-\frac{1}{2}$ and 1

d) 2 and -4 e) none of these

42. The value of $\sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2+...}}}}$ is exactly equal to:

a) 4 b) 2 c) $2.\overline{2}$ d) 1 e) none of these

43. Find the value of $(1-i\sqrt{3})^5$

a) $32+32\sqrt{3}i$ b) $32-32\sqrt{3}i$ c) $16+16\sqrt{3}i$

d) $16-16\sqrt{3}i$ e) none of these

44. If $A=\begin{bmatrix}2 & \\ 5 & 3\end{bmatrix}$, then the row 2, column 1 element of A^{-1} is:

a) -5 b) $\frac{1}{5}$ c) 1 d) $-\frac{1}{5}$ e) none of these

45. If $F(n+1)=\frac{2F(n)+1}{2}$ for n =1,2,3,. ., and $F(1)=2$. Then $F(101)=$

a) 49 b) 50 c) 51 d) 52 e) none of these