HARBIY 5.07.2019

MATEMATIKA YECHIMLARI
TELEGRAMDAGI MANZILIMIZ
@AXBOROTNOMA
PDF. Farmatiga o'tkazgan shahs.

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Matematika 5.07.2019.

1. 12345...110111
$1\cdot 9 + 2\cdot 90 + 3\cdot 12 = 225$ (D)

2. 12345...110111112
$1\cdot 9 + 2\cdot 90 + 3\cdot 13 = 228$ (D)

3. 12345...110111
TURLI RAQAM 10 TA (B)

4. 0;1;2;3;4
$4\cdot 5\cdot 5 = 100$ (A)

5. 1;2;3;4;5
$5\cdot 5\cdot 5 = 125$ (B)

6. 0;1;2;3;4;5;6
$6\cdot 7\cdot 7 = 294$ (E) :-))

7. $2^4 = 16$ (A)

8. $2^5 = 32$ (C)

9. $A = \{a; b; c; d; e; f\}$
$n=6$ $2^6 = 64$ $2^5 = 32$ (C)
$64 - 32 = 32$
d element qatnashmagan qism to'plamlar soni 32 ta, qatnashgani ham 32 ta.

10. $A = \{a; b; c; d; e; f\}$
$B = \{a; b; d; e; f\}$ $C = \{a; d; e; f\}$
$n=5$ $2^5 = 32$ $n=4$ $2^4 = 16$
$32 - 16 = 16$ (A)

11. $A = \{a; b; c; d; e; f\}$
$b = \{a; b; e; f\}$
$n=4$ $2^4 = 16$ (A)

12. $A = \{a; b; c; d\}$ $C_3^0 + C_3^1 + C_3^2 = 4$.
$\{a\}\{e\}$ $\{c\}$ $\{a;b\}$ $\{b;d\}$ $\{a;b;c;d\}$
$\{d\}\{a;c\}$ $\{c;d\}$ $\{a;b;c\}$ $\{a;d\}$ $\{\emptyset\}$
$\{a;e;d\}$ $\{a;c;d\}$ $\{b;c;d\}$ $\{bc\}$.

13. $A = \{0; 1; 2; 5; 6; 7; 9\}$ $B = \{1; 4; 8; 9\}$
$A \cup B = \{0; 1; 2; 4; 5; 6; 7; 8; 9\}$ $n=9$.
$2^9 - 2 = 512 - 2 = 510$.

14. $A = \{x \mid x = 2n; n \in N\}$.
$B = \{x \mid x = 2n+1; n \in N\}$.
$A \cup B = N \setminus \{1\}$. (C)

15. $A = \{x \mid x = 2n; n \in N\}$.
$B = \{x \mid x = 2n+1; n \in N\}$.
$A \cap B = \emptyset$ (D)

16. $N(2) = 63 = [\frac{126}{2}]$
$N(7) = 18 = [\frac{126}{7}]$ $63 + 18 - 9 = 72$.
$N(14) = 9 = [\frac{126}{14}]$ $126 - 72 = 54$ (D)

17. $N(3) = 45$
$N(5) = 27$ $45 + 27 - 9 = 63$
$N(15) = 9$ $135 - 63 = 72$ (B)

18. $N(5) = 40 = [\frac{200}{5}]$
$N(7) = 28 = [\frac{200}{7}]$ $40 + 28 - 5 = 63$
$N(35) = 5 = [\frac{200}{35}]$ $200 - 63 = 137$.
(A)

19. 324; 255; 71
(C) EKUB(324-255; 255-71) = 23.

20. $128^{143} = 128^3 = \ldots 2$ (B)

21. $433^{333} = 433^1 = \ldots 3$ (C)

22. $233^{233} = 233^1 = \ldots 3$ (C)

23. $373^{373} = 373^1 = \ldots 1$ (C)

24. $999^{2^{999^{999}}} = 999^2 = \ldots 1$ (A)

25. $888^{2^{999^{888}}} = 888^4 = \ldots 6$ (C)

26. $x = 44$.
$x + 2\cdot n = 62$. $n = 9$. (A)

27. $x = 52$
$x + 2\cdot n = 72$ $n = 10$ (B)

28. $\begin{cases} x+y = 1{,}5(x-y) \\ \frac{x^2+y^2}{xy} = \frac{25y^2+y^2}{5y^2} = \frac{26}{6} = 4{,}3 \end{cases}$ $2x + 2y = 3x - 3y$
$5y = x$.
(A) 430%
100%

29. $a^2-b^2=49$.

$(a+b)(a-b)=49\cdot 1$.

$\begin{cases} a+b=49 & a=25 \\ a-b=1 & b=24 \end{cases}$

(B) $3\cdot 25-2\cdot 24=75-48=27$

30. $a^2-b^2=25$.

$(a+b)(a-b)=25\cdot 1$

$\begin{cases} a+b=25 & a=13 \\ a-b=1 & b=12 \end{cases}$ (C)

$2\cdot 13-12=26-12=14$

31. $a^2-b^2=9$.

$(a+b)(a-b)=9\cdot 1$

$\begin{cases} a+b=9 & a=5 \\ a-b=1 & b=4 \end{cases}$ (C)

$2\cdot 5-3\cdot 4=10-12=-2$.

32. $(n-m)(n+m)=25$.

$\begin{cases} n-m=1 & n=13 \\ n+m=25 & m=12 \end{cases}$ (B)

$n+2m=13+2\cdot 12=37$

33. $NBS(ELCUB(911;659;647+367))$

$NBS(1)=1$. (A)

911	911	659	659	1014	2
1		1		507	3
				169	13
				13	13
				1	

$ELCUB=1$.

34. $ELCUK(NBS(144);51))=ELCUK(15;51)$

$144=2^4\cdot 3^2$ $NBS=(4+1)(2+1)=15$. (B)

15	3	51	3
5	5	17	17
1		1	

$ELCUK=3\cdot 5\cdot 17=255$

35. $3a-[5a-(3a-(2a+b))]=$

$=3a-[5a-(3a-2a-b)]=$ (B)

$=3a-(5a-a+b)=3a-4a-b=-a-b$

36. $5a-[4a-(3a-(2a-b))]=$

$=5a-(4a-(3a-2a+b))=$ (A)

$=5a-(4a-a-b)=5a-3a+b=2a+b$

37. $\frac{1}{a(a-b)(a-c)}+\frac{1}{b(b-a)(b-c)}+\frac{1}{c(c-a)(c-b)}=$

$\frac{1}{a(a-b)(a-c)}-\frac{1}{b(b-c)(a-b)}+\frac{1}{c(a-c)(b-c)}=$

$=\frac{bc(b-c)-ac(a-c)+ab(a-b)}{abc(a-b)(a-c)(b-c)}=$

$=\frac{b^2c-bc^2-a^2c+ac^2+a^2b-ab^2}{abc(a-b)(a-c)(b-c)}=$ (C)

$=\frac{b^2c-bc^2-a^2c+ac^2+a^2b-ab^2}{abc(b^2c-bc^2-a^2c+ac^2+a^2b-ab^2)}=\frac{1}{abc}$

38. $-\frac{1}{abc}$ 37 ni minusligi. (B)

39. $\frac{a+b}{a^{\frac{3}{3}}-a^{\frac{1}{3}}b^{\frac{1}{3}}+b^{\frac{3}{3}}}-\frac{a-b}{a^{\frac{2}{3}}+a^{\frac{1}{3}}b^{\frac{1}{3}}+b^{\frac{2}{3}}}=$ (A)

$=a^{\frac{1}{3}}+b^{\frac{1}{3}}-a^{\frac{1}{3}}+b^{\frac{1}{3}}=2b^{\frac{1}{3}}=2\sqrt[3]{b}$.

40. $\frac{(\sqrt{a}-\sqrt{b})^3+2a^2:\sqrt{a}+b\sqrt{b}}{a\sqrt{a}+b\sqrt{b}}+\frac{3\sqrt{ab}-3b}{a-b}$

1) $\frac{\sqrt{a^3}-3a\sqrt{b}+3\sqrt{a}\cdot b-b\sqrt{b}+2a\sqrt{a}+b\sqrt{b}}{\sqrt{a^3}+\sqrt{b^3}}$

$=\frac{3(a\sqrt{a}-a\sqrt{b}+\sqrt{a}\cdot b)}{(\sqrt{a}+\sqrt{b})(a-\sqrt{ab}+b)}=\frac{3\sqrt{a}}{\sqrt{a}+\sqrt{b}}$

2) $\frac{3\sqrt{a}}{\sqrt{a}+\sqrt{b}}+\frac{3\sqrt{ab}-3b}{a-b}=\frac{3\sqrt{a}(\sqrt{a}-\sqrt{b})+}{a-b}$

$+3\sqrt{ab}-3b=\frac{3a-3\sqrt{ab}+3\sqrt{ab}-3b}{a-b}=$

$=3$. (C)

41. $\frac{(\sqrt{a}+\sqrt{b})^3+2a^2:\sqrt{a}+b\sqrt{b}}{a\sqrt{a}+b\sqrt{b}}-\frac{3\sqrt{ab}+3b}{a-b}$

1) $\frac{\sqrt{a^3}+3a\sqrt{b}+3\sqrt{a}\cdot b+b\sqrt{b}+2a\sqrt{a}-b\sqrt{b}}{a\sqrt{a}-b\sqrt{b}}$

$=\frac{3\sqrt{a^3}+3a\sqrt{b}+3\sqrt{a}\cdot b}{(\sqrt{a}-\sqrt{b})(a+\sqrt{ab}+b)}=\frac{3\sqrt{a}}{\sqrt{a}-\sqrt{b}}$.

2) $\frac{3\sqrt{a}}{\sqrt{a}-\sqrt{b}}-\frac{3\sqrt{ab}-3b}{a-b}=\frac{3\sqrt{a}(\sqrt{a}+\sqrt{b})}{a-b}$

$-3\sqrt{ab}+3b=\frac{3a+3\sqrt{ab}-3\sqrt{ab}+3b}{a-b}=$

$=3$ (C).

42. $a=75$ $p=4$ $q=3$
$75\cdot 0{,}04=3$
$75\cdot 0{,}003=0{,}225$ (A)

43. $a>1$. (C)
1) $\log_a\log_a\lg 5$ 3) $\lg\log_a\lg 5$

44. $0<a<1$ (D)
$\log_a\log_a\log_{\frac{1}{3}}\frac{1}{3}$

45. $y=\frac{2}{x}-3$ $(-\infty;-3)\cup(-3;\infty)$ (B)

46. $y=\frac{3}{x}-4$ $(-\infty;-4)\cup(-4;\infty)$ (B)

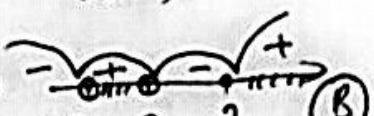
47. $y=\frac{4}{x}-2$ $(-\infty;-2)\cup(-2;\infty)$ (B)

48. $y=\arccos 2^x$
$-1\le 2^x\le 1$. $x\le 0$. (C)

49. $y=\arcsin 3^x$
$-1\le 3^x\le 1$ $x\le 0$ (C)

50. $f(x)=\frac{5}{x}-\sqrt{\frac{x-2}{x(x+3)}}$

$\begin{cases} x\neq 0 \\ \frac{x-2}{x(x+3)}\ge 0 \end{cases}$



(B)

51. $f(x)$ $(-\infty;\infty)$ $y=2f(x-1)-7$. (A)

52. $f(x)$ $y=2f(x-1)-7$.
monoton (A).

53. $\begin{cases} f(x)+2f\left(\frac{1}{x}\right)=x. \\ f\left(\frac{1}{x}\right)+2f(x)=\frac{1}{x}\ (x\neq 0) \end{cases}$

$\ominus\begin{cases} f(x)+2f\left(\frac{1}{x}\right)=x. \\ 2f\left(\frac{1}{x}\right)+4f(x)=\frac{2}{x} \end{cases}$ (B)

$3f(x)=\frac{2}{x}-x$. $f(x)=\frac{2-x^2}{3x}$.

54. $f(x)+xf\left(\frac{x}{2x-1}\right)=2$ $f(x)=?$

$\frac{x}{2x-1}=a$ $x=2ax-a$. $a=2ax-x$. $x=\frac{a}{2a-1}$.

$\ominus\begin{cases} f\left(\frac{a}{2a-1}\right)+\frac{a}{2a-1}f(a)=2. \\ f(a)+af\left(\frac{a}{2a-1}\right)=2\ :\ a. \end{cases}$ (A)

$\frac{a}{2a-1}f(a)-\frac{1}{a}f(a)=2-\frac{2}{a}$.

$\left(\frac{a}{2a-1}-\frac{1}{a}\right)f(a)=\frac{2a-2}{a}$ $f(a)=\frac{2a-2}{a}\cdot\frac{a(2a-1)}{a^2-2a+1}$

$f(a)=\frac{2(2a-1)}{a-1}$ $f(x)=\frac{4x-2}{x-1}$

55. $y=\frac{x^2}{\sqrt{x^2+5}}$ $y'=\frac{2x\sqrt{x^2+5}-x^2\frac{2x}{2\sqrt{x^2+5}}}{x^2+5}$

$=\frac{2x(x^2+5)-x^3}{(x^2+5)\sqrt{x^2+5}}=\frac{x^3+10x}{\sqrt{(x^2+5)^3}}$ (D)

56. $f(x)=x^3-3x^2+2x-1$ $f'(2)=?$
$f'(x)=3x^2-6x+2$ $f'(2)=12-12+2$
$f'(2)=2$ (C)

57. $f(x)=\frac{x^3-8}{x^2+2x+4}=x-2$
$f(2x-1)=2x-1-2=2x-3$.
$f'(2x-1)=2$ (C)

58. $f(x)=\frac{x^3-8}{x^2+2x+4}-2x+1=x-2-2x+1=-x-1$
$f'(x)=-1$ (D)

58. $f(x)=\frac{x^3-8}{x^2+2x+4}$ $f'(x)=\frac{3x^2(x^2+2x+4)-(x^3-8)(2x+2)}{(x^2+2x+4)^2}$

$f'(0)=\frac{-16}{16}=-1$.

(D).

59. $f(x)=\frac{x^3-8}{x^2+2x+4}-2x+1$.

$f(x)=x-2-2x+1$

$f(x)=-x-1$.

$f'(x)=-1$ (D)

60. $y=\frac{x^3-27}{x^2-3x+9}+3x$ $y'(1)=?$

$y'=\frac{3x^2(x^2-3x+9)-(x^3-27)(2x-3)}{(x^2-3x+9)^2}+3$

$y'(1)=\frac{3(1-3+9)-(1-27)(2-3)}{(1-3+9)^2}+3=$

$=\frac{21-26}{49}+3=2\frac{44}{49}$ (D)

61. $F'(x)=x-4$ $F(2)=0$. $F(x)=?$

$F(x)=\frac{x^2}{2}-4x+C$.

$0=2-8+C$ $C=6$

$F(x)=\frac{x^2}{2}-4x+6$ (B)

62. $f(x)=2x^2-x$ $x=4$ $\Delta x=0,1$.

$\Delta y=f(x+\Delta x)-f(x)=1,52$ (C)

$f(4,1)=2\cdot 4,1^2-4,1=29,52$

$f(4)=2\cdot 4^2-4=28$.

63. $f(x)=x^2-2x$ $x=3$ $\Delta x=0,1$.

$\Delta y=f(x+\Delta x)-f(x)=0,41$ (B)

$f(3,1)=3,1^2-2\cdot 3,1=3,41$

$f(3)=3^2-2\cdot 3=3$

65. $f(x)\cdot f'(x)\geq 0$.

1.	+	−	$(-\infty;-6]$
(2)	−	−	$[-6;-4]$
3.	−	+	$[-4;-3]$ (B)
(4)	+	+	$[-3;0]$
5.	+	−	$[0;4]$
(6)	−	−	$[4;5]$
7.	−	+	$[5;6]$
(8)	+	+	$[6;\infty)$

64. $f(x)=-x^2+2x$ $x=-2$. $\Delta x=0,1$.

$\Delta y=f(x+\Delta x)-f(x)$.

$\Delta y=f(-1,9)-f(-2)=-7,41+8=0,59$

$f(-1,9)=-1,9^2-2\cdot 1,9=-7,41$ $f(-2)=-4-4=8$

66. $f(x)\cdot f'(x)<0$.

(1)	+	−	$(-\infty;-6)$
2.	−	−	$(-6;-4)$
(3)	−	+	$(-4;-3)$
4.	+	+	$(-3;0)$
(5)	+	−	$(0;4)$
6.	−	−	$(4;5)$
(7)	−	+	$(5;6)$ (C)
8.	+	+	$(6;\infty)$

67. $\frac{f'(x)}{f(x)}>0$ 65-misol özi faqat qo'shiy. (D)

68. $0,25y'=y$. $\frac{dy}{dx}=4y$. $\int\frac{dy}{y}=\int 4dx$

$\ln y=4x+C$. $y=Ce^{4x}$ (A)

69. $0,5y'=y$ $\frac{dy}{dx}=2y$ $\int\frac{dy}{y}=\int 2dx$

$\ln y=2x+C$ $y=Ce^{2x}$ (A)

70. $v(t)=2t^3+9t+3$

$v'(t)=a(t)=6t^2+9$ (D)

71. $v(t)=-2t^3+9t+15$.

$a(t)=-6t^2+9$. (D)

72. $y=9-x^2$ $x=-3$ $y=9-9=0$.

$k=-2x=6$.

$y=6(x+3)=6x+18$ (B)

73. $\int(x^3-\cos 4x)dx=\frac{x^4}{4}-\frac{1}{4}\sin 4x+C$ (B)

74. $\int x^2\sin x^3dx=\int\frac{1}{3}\sin x^3dx^3=$

$=-\frac{1}{3}\cos x^3+C$ (B)

75. $\int x^3\sin x^4dx=\int\frac{1}{4}\sin x^4dx^4=$

$=-\frac{1}{4}\cos x^4+C$. (B)

76. $\int x^3\cos x^4dx=\int\frac{1}{4}\cos x^4dx^4=$

$=\frac{1}{4}\sin x^4+C$ (C)

(D) 77. $\int\arcsin x\,dx$

ALPHRAGANUS

77. $\int \arcsin x\,dx = \left[\begin{matrix}\arcsin x = t & dx = \cos t\,dt \\ x = \sin t\end{matrix}\right]$

$\int t\cdot\cos t\,dt = \left[\begin{matrix}t = u & \cos t\,dt = d\vartheta \\ dt = du & \sin t = \vartheta\end{matrix}\right] =$

$= u\cdot\vartheta - \int \vartheta\,du = t\cdot\sin t - \int \sin t\cdot dt =$ (B)

$= t\cdot\sin t + \cos t = x\cdot\arcsin x + \sqrt{1-x^2} + C.$

78. $\int x\cdot a^x dx = \left[\begin{matrix}x = u & a^x dx = d\vartheta \\ dx = du & \frac{a^x}{\ln a} = \vartheta\end{matrix}\right] =$

$= x\cdot\frac{a^x}{\ln a} - \int \frac{a^x}{\ln a}\,du = x\cdot\frac{a^x}{\ln a} - \frac{a^x}{\ln^2 a} + C.$ (A)

79. $\int x\cdot 3^x dx = x\cdot\frac{3^x}{\ln 3} - \frac{3^x}{\ln^2 3} + C.$ (A)

80. $\int \cos x\cdot e^x dx = \left[\begin{matrix}\cos x = u & e^x dx = d\vartheta \\ -\sin x\,dx = du & e^x = \vartheta\end{matrix}\right]$

$= e^x\cdot\cos x + \int e^x\cdot\sin x\,dx = e^x\cdot\cos x + e^x\cdot\sin x -$

$- \int e^x\cdot\cos x\,dx$

$2\int e^x\cos x\,dx = e^x\cos x + e^x\cdot\sin x.$

$\int e^x\cos x\,dx = \frac{e^x}{2}(\cos x + \sin x) + C$ (A)

81. $\int \ln(\sin x)^{\cos x} dx = \int \cos x\ln\sin x\,dx =$

$\int \ln\sin x\,d(\sin x) = \left[\sin x = t\right] = \int \ln t\,dt =$

$= \left[\begin{matrix}\ln t = u & dt = d\vartheta \\ \frac{1}{t}dt = du & t = \vartheta\end{matrix}\right] = t\cdot\ln t - \int t\cdot\frac{1}{t}dt =$

$= t\cdot\ln t - t + C = \sin x\cdot\ln\sin x - \sin x + C$ (C)

82. (B) $\int_{-1}^{1}(\operatorname{tg} x + \sin x)\,dx = 0.$ $\int_{-1}^{1}$ Toq funksiya $dx = 0.$

96. $\sin x \cdot \cos x = -0{,}345$. $1{,}6 < x < 3{,}1$.
II chorak $\sin x > 0$ $\cos x < 0$.
$\sin x - \cos x = \sqrt{1 - \sin 2x} =$ (A)
$= \sqrt{1 + 2 \cdot 0{,}345} = \sqrt{1 + 0{,}69} = 1{,}3$

97. $\cos x = -\sqrt{0{,}2}$ $\sin\left(\frac{5\pi}{2} - 2x\right) =$ (B)
$= \cos 2x = 2\cos^2 x - 1 = 2 \cdot 0{,}2 - 1 = -0{,}6$

98. $\frac{1 + \sin 2x}{\sin x + \cos x} - \frac{1 - \operatorname{tg}^2 \frac{x}{2}}{1 + \operatorname{tg}^2 \frac{x}{2}} = \sin x + \cos x - \cos x$
$\sin 5^\circ$ (C)

99. $\sin\alpha \cos^3\alpha + \cos\alpha \sin^3\alpha = \sin\alpha \cos\alpha (\sin^2\alpha + \cos^2\alpha) =$
$= \frac{1}{2} \sin 2\alpha$ (B)

100 $\sin 3\alpha \cos^3\alpha + \cos 3\alpha \sin^3\alpha =$
$= (3\sin\alpha - 4\sin^3\alpha)\cos^3\alpha + (4\cos^3\alpha - 3\cos\alpha)\sin^3\alpha =$
$= 3\sin\alpha\cos^3\alpha - 4\sin^3\alpha\cos^3\alpha + 4\cos^3\alpha\sin^3\alpha - 3\cos\alpha\sin^3\alpha$
$= 3\sin\alpha\cos\alpha(\cos^2\alpha - \sin^2\alpha) = \frac{3}{2}\sin 2\alpha\cos 2\alpha =$
$= \frac{3}{4}\sin 4\alpha$. (C)

101 $\frac{\sin(2y+x) + \sin(2y-x)}{\sin x - \sin(2y-x)} \cdot \frac{\operatorname{tg} y - \operatorname{tg} x}{\operatorname{tg} y \operatorname{tg} x} =$
$= -\frac{2\sin 2y \cos x}{2\cos y \sin(x-y)} \cdot \frac{\sin(y-x)}{\operatorname{tg} y \cos x \cos y} =$
$= -\frac{2\sin y \cos y}{\cos y \cdot \frac{\sin y}{\cos y} \cdot \cos y} = -2$. (A)

102. $\frac{\sin(2x+y) + \sin(2x-y)}{\sin(2x+y) + \sin y} \cdot \frac{\operatorname{tg} y + \operatorname{tg} x}{\operatorname{tg} x} =$ (C)
$= \frac{2\sin 2x \cos y}{2\sin(x+y)\cos x} \cdot \frac{\sin(x+y)}{\cos x \cos y \cdot \operatorname{tg} x} = 2$.

103. $\frac{\sin(4x+y) + \sin(4x-y)}{\sin y - \sin(4x-y)} \cdot \frac{\operatorname{tg} y - \operatorname{tg} 2x}{\operatorname{tg} y \operatorname{tg} 2x} =$
(A) $= -\frac{2\sin 4x \cdot \cos y}{2\cos 2x \cdot \sin(2x-y)} \cdot \frac{\sin(y-2x)}{\operatorname{tg} y \operatorname{tg} 2x \cos 2x \cos y} = -2$

104. $\frac{\sqrt{13} - 4}{\sqrt{\sqrt{13} - 3} + 1} - \frac{\sqrt{13} - 12}{\sqrt{\sqrt{13} - 3} - 3} = \frac{(\sqrt{13} - 4)(\sqrt{\sqrt{13} - 3} - 1)}{\sqrt{13} - 3 - 1} -$
$- \frac{(\sqrt{13} - 12)(\sqrt{\sqrt{13} - 3} + 3)}{\sqrt{13} - 1 - 9} =$
$= \sqrt{\sqrt{13} - 3} - 1 + \sqrt{\sqrt{13} - 3} + 3 =$
$= 4$. (B)

105. $\frac{\sqrt{21} - 4}{\sqrt{\sqrt{21} - 3} - 1} - \frac{\sqrt{21} - 12}{\sqrt{\sqrt{21} - 3} + 3} =$
$= \frac{(\sqrt{21} - 4)(\sqrt{\sqrt{21} - 3} + 1)}{\sqrt{21} - 3 - 1} - \frac{(\sqrt{21} - 12)(\sqrt{\sqrt{21} - 3} + 3)}{\sqrt{21} - 3 - 9} =$
$= \sqrt{\sqrt{21} - 3} + 1 - \sqrt{\sqrt{21} - 3} - 3 = -2$.
(C)

106. $\frac{\sqrt{23} - 4}{\sqrt{\sqrt{23} - 3} - 1} - \frac{\sqrt{23} - 12}{\sqrt{\sqrt{23} - 3} + 3} =$
$= \frac{(\sqrt{23} - 4)(\sqrt{\sqrt{23} - 3} + 1)}{\sqrt{23} - 3 - 1} - \frac{(\sqrt{23} - 12)}{\sqrt{23} - 12}$
$(\sqrt{\sqrt{23} - 3} - 3) =$
$= \sqrt{\sqrt{23} - 3} + 1 - \sqrt{\sqrt{23} - 3} + 3$
$= 4$. (B)

107. $\frac{\sqrt[3]{(5 + 2\sqrt{6})^2}}{\sqrt[3]{5 - \sqrt{24}}} - 6 - \sqrt{24} =$
(B) $= \sqrt[3]{\frac{(5 + 2\sqrt{6})^3}{25 - 24}} - 6 - \sqrt{24} = -1$.

108. $16 \sin 10^\circ \cdot \sin 30^\circ \cdot \sin 50^\circ \cdot$
(A) $\sin 70^\circ \cdot \sin 90^\circ =$
$= 16 \cdot \frac{1}{4} \sin 30^\circ \cdot \sin 30^\circ = 4 \cdot \frac{1}{2} \cdot \frac{1}{2} = 1$

109. $32 \cos 10^\circ \cdot \cos 30^\circ \cdot \cos 50^\circ \cdot$
$\cos 60^\circ \cdot \cos 70^\circ =$
$= 32 \cdot \frac{\sqrt{3}}{2} \cdot \frac{1}{2} \cdot \frac{1}{4} \cos 30^\circ =$
$= 2\sqrt{3} \cdot \frac{\sqrt{3}}{2} = 3$. (B)

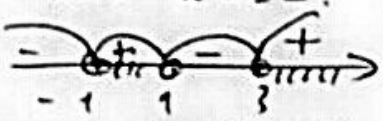
110. $\lg \operatorname{tg} 1^\circ + \lg \operatorname{tg} 2^\circ + \ldots + \lg \operatorname{tg} 89^\circ =$
$= \lg \operatorname{tg} 1^\circ \cdot \operatorname{tg} 2^\circ \cdot \ldots \operatorname{tg} 89^\circ = 0$.
(C) $\operatorname{tg} x \cdot \operatorname{tg} y = 1$. $x + y = 90^\circ$.

111. $\lg \operatorname{tg} 1^\circ \cdot \lg \operatorname{tg} 2^\circ \cdot \ldots \lg \operatorname{tg} 89^\circ =$
$\lg \operatorname{tg} 45^\circ = \lg 1 = 0$.
(C)

112. (B) $\lg\sin 1^\circ \cdot \lg\sin 2^\circ \cdot \lg\sin 3^\circ \cdot \ldots \cdot \lg\sin 89^\circ =$
$= 0. \quad \lg\sin 90^\circ = \lg 1 = 0.$

113. $2^{|x+2|} > 16 \quad |x+2| > 4.$
$x+2 > 4. \quad x > 2.$
$x+2 < -4. \quad x < -6.$ (A)

114. $x^4 \cdot 2^x + 8 > 8x^4 + 2^x$
$x^4(2^x - 8) - (2^x - 8) > 0.$
$(2^x - 8)(x^4 - 1) > 0.$
$x = 3 \quad x = \pm 1.$ (A)



115. $(0,3)^{2+4+6+\ldots+2x} > (0,3)^{72}.$
$2+4+6+\ldots+2x < 72.$
$\frac{2+2x}{2} \cdot x < 72 \quad x^2 + x - 72 < 0$
$(-9; 8)$

116. $\arccos x < \arcsin x$
$\frac{\pi}{2} - \arcsin x < \arcsin x.$
$\arcsin x > \frac{\pi}{4}$
$\left[\frac{\sqrt{2}}{2}; 1\right]$ (B)

117. $\operatorname{arctg} x \geq \operatorname{arcctg} x.$
$\operatorname{arctg} x \geq \frac{\pi}{2} - \operatorname{arcctg} x.$
$2\operatorname{arctg} x \geq \frac{\pi}{2} \quad \operatorname{arctg} x \geq \frac{\pi}{4}.$
$[1; \infty).$ (A)

118. $\frac{\left(\sqrt{3x-2}\right)^2 - 2}{x-3} \leq \frac{3 - (\sqrt{x})^2}{x-3}.$

$\begin{cases} 3x - 7 \geq 0. & x \geq \frac{7}{3} \\ x \geq 0 \end{cases}$

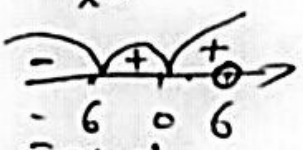
$\frac{3x-7-2}{x-3} \leq \frac{3-x}{x-3}.$

$\frac{3x-9}{x-3} \leq -1.$

$3 \leq -1.$ $\varnothing$

119. $\frac{36 - x^2}{6x^{-2} - x^{-1}} \geq 0 \quad \frac{(6-x)(6+x)}{\frac{(6-x)}{x^2}} \geq 0.$

$\begin{cases} x^2(6+x) \geq 0. \\ 6 - x \neq 0. \end{cases}$

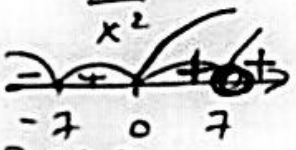


$[-5; 13)$

(B) $\frac{5+7+8+9+10+11+12}{7} = \frac{5+12}{2} = 8\frac{1}{2}$

121. $\frac{x^2 - 49}{-7x^{-2} + x^{-1}} \leq 0 \quad \frac{x^2 - 49}{\frac{x-7}{x^2}} \leq 0.$

$\begin{cases} (x+7)x^2 \leq 0. \\ x - 7 \neq 0 \end{cases}$



(C) $\frac{-9-8-7}{3} = -8$ $[-9; 1].$

120. $\frac{64 - x^2}{8x^{-2} - x^{-1}} \geq 0 \quad [5; 13).$

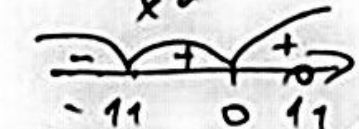
$\frac{(8-x)(8+x)}{\frac{8-x}{x^2}} \geq 0$

$\begin{cases} x^2(8+x) \geq 0. \\ 8 - x \neq 0. \end{cases}$

$\frac{5+6+7+9+10+11+12}{7} = \frac{5+12}{2} = 8\frac{1}{2}$

122. $\frac{x^2 - 121}{-11x^{-2} + x^{-1}} \geq 0 \quad (3; 12).$

$\frac{(x-11)(x+11)}{\frac{x-11}{x^2}} \geq 0 \quad \begin{cases} x^2(x+11) \geq 0 \\ x - 11 \neq 0. \end{cases}$



$\frac{4+10}{2} = 7.$ (B)

123. $\log_{18}(3x+1) > \frac{1}{2}.$
$3x + 1 > 3\sqrt{2}.$
$x > \frac{3\sqrt{2} - 1}{3}.$ (A)

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