BCS Career SPARK

Engr. ALIF EMRAN (B.Sc in EEE, BUET)

Assistant Engineer, DESCO (power division)

ASP, 43rd BCS POLICE(recommended)

AD, BANGLADESH BANK (recommended)

Assistant Engineer,Bangladesh Railway(Gazetted)

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BCS Math Written

L-05+06(Log & Power)

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$\log_a x^n = n$

$x = a^n$

$\log a^n = n \log a$

$\log_a a = 1$

$\log_a 1 = 0$

$\log A + \log B = \log(AB)$

$\log A - \log B = \log\left(\frac{A}{B}\right)$

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দেখাও যে,

$$\frac{1}{\log_a(abc)}+\frac{1}{\log_b(abc)}+\frac{1}{\log_c(abc)}=1$$

$$\log_a b = \frac{1}{\log_b a}$$

$$L.S. = \frac{1}{\log_a(abc)} + \frac{1}{\log_b(abc)} + \frac{1}{\log_c(abc)}$$

$$= \log_{(abc)} a + \log_{abc} b + \log_{abc} c$$

$$= \log_{abc}(a \cdot b \cdot c)$$

$$= \log_{abc}(abc)$$

$$= 1 = R.S$$

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$$\log_a \log_a \log_a a^{a^b} = ?$$

$$= \log_a \log_a a^b \cdot \log_a a$$

$$= \log_a \log_a (a^b \cdot 1)$$

$$= \log_a \log_a a^b$$

$$= \log_a b \log_a a$$

$$= \log_a b$$

$$\log a^n = n \log a$$

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সরল করুনঃ $\dfrac{\log\sqrt{27}+\log 8-\log\sqrt{1000}}{\log 1.2}$

$$= \frac{\log 3^{\frac{3}{2}} + \log 4^{\frac{3}{2}} - \log 10^{\frac{3}{2}}}{\log 1.2}$$

$$= \frac{\frac{3}{2}\log 3 + \frac{3}{2}\log 4 - \frac{3}{2}\log 10}{\log 1.2}$$

$$= \frac{\frac{3}{2}(\log 3 + \log 4 - \log 10)}{\log 1.2}$$

$$= \frac{\frac{3}{2} \times \left(\log \frac{3\times 4}{10}\right)}{\log 1.2}$$

$$= \frac{\frac{3}{2}\log 1.2}{\log 1.2} = \frac{3}{2}$$

$\sqrt{27} = \sqrt{3^3}$

$= (3^3)^{\frac{1}{2}}$

$= 3^{\frac{3}{2}}$

$\sqrt{1000} = \sqrt{10^3}$

$= (10^3)^{\frac{1}{2}}$

$= 10^{\frac{3}{2}}$

$8 = 2^3$

$= (\sqrt{4})^3 = 4^{3/2}$

$\log_x^{\frac{1}{9}} = -2$ হলে x এর মান কত?

$\log_2^{(x^2-5x+10)} = 2$ হলে x এর মান কত?

$\log_a(x) = n$

$x = a^n$

$\Rightarrow \log_x\left(\frac{1}{9}\right) = -2$

$\Rightarrow \frac{1}{9} = x^{-2}$

$\Rightarrow \frac{1}{9} = \frac{1}{x^2}$

$\Rightarrow x^2 = 9$

$x = \pm 3$

ভিত্তি ঋণাত্মক হতে পারে না

$x = 3$

$\log_2(x^2-5x+10) = 2$

$\Rightarrow x^2-5x+10 = 2^2$

$\Rightarrow x^2-5x+6 = 0$

$\Rightarrow x^2-3x-2x+6 = 0$

$\Rightarrow x(x-3)-2(x-3) = 0$

$\Rightarrow (x-3)(x-2) = 0$

$x = 3, 2$

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$\log_{10}[98 + \sqrt{x^2 - 12x + 36}] = 2$ ***

$\Rightarrow 98 + \sqrt{x^2-12x+36} = 10^2$

$\Rightarrow \sqrt{x^2-12x+36} = 2$

$\Rightarrow x^2-12x+36 = 4$

$\Rightarrow x^2-12x+32 = 0$

$\Rightarrow x^2-8x-4x+32=0$

$\Rightarrow x(x-8)-4(x-8)=0$

$\Rightarrow (x-8)(x-4)=0$

$x = 8, 4$

$$\log_{\sqrt{8}} x = 3\frac{1}{3}, \; x = ?$$

$$\Rightarrow x = (\sqrt{8})^{\frac{10}{3}}$$

$$= \left\{(2^3)^{\frac{1}{2}}\right\}^{\frac{10}{3}}$$

$$= 2^{\frac{3}{2}\times\frac{10}{3}}$$

$$= 2^5$$

$$= 32$$

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যদি $\frac{\log_k(1+x)}{\log_k x}=2$ হয়, তবে দেখান যে, $x=\frac{1+\sqrt{5}}{2}$ (37th)

$\Rightarrow \log_k(1+x) = 2\log_k x$

$\Rightarrow \log_k(1+x) = \log_k x^2$

$\Rightarrow 1+x = x^2$

$\Rightarrow x^2 - x - 1 = 0$

$\therefore x = \frac{1 \pm \sqrt{(-1)^2 - 4\cdot 1\cdot(-1)}}{2\cdot 1}$

$x = \frac{1 \pm \sqrt{5}}{2}$

$x = \frac{1+\sqrt{5}}{2}$

$x \neq \frac{1-\sqrt{5}}{2}$

ঋণাত্মক

$x = \frac{1+\sqrt{5}}{2}$

$ax^2+bx+c=0$

$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

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If $\log\left(\frac{x+y}{2}\right) = \frac{1}{2}(\log x + \log y)$, then prove that $\frac{x}{y} + \frac{y}{x} = 2$

$\Rightarrow 2\log\left(\frac{x+y}{2}\right) = \log x + \log y$

$\Rightarrow \log\left(\frac{x+y}{2}\right)^2 = \log(xy)$

$\Rightarrow \left(\frac{x+y}{2}\right)^2 = xy$

$\Rightarrow \frac{x^2+2xy+y^2}{4} = xy$

$\Rightarrow x^2+2xy+y^2 = 4xy$

$\Rightarrow x^2+y^2 = 2xy$

$\Rightarrow \frac{x^2}{xy} + \frac{y^2}{xy} = 2$

$\Rightarrow \frac{x}{y} + \frac{y}{x} = 2$

যদি, $\frac{\log a}{y-z} = \frac{\log b}{z-x} = \frac{\log c}{x-y}$ হয়, তবে $a^x b^y c^z = ?$ [43rd BCS]

যদি $\frac{\log_k a}{y-z} = \frac{\log_k b}{z-x} = \frac{\log_k c}{x-y}$ হয়, তবে দেখান যে, $a^{y+z} b^{z+x} c^{x+y} = 1$

যদি $\frac{\log_k a}{y-z} = \frac{\log_k b}{z-x} = \frac{\log_k c}{x-y}$ হয়, তবে দেখান যে, $a^{y^2+yz+z^2} \cdot b^{z^2+zx+x^2} \cdot c^{x^2+xy+y^2} = 1$

ধরি, $\frac{\log_k a}{y-z} = \frac{\log_k b}{z-x} = \frac{\log_k c}{x-y} = P$

$\therefore \log_k a = P(y-z)$

$\Rightarrow (y^2+yz+z^2)\cdot \log_k a = P(y-z)(y^2+yz+z^2)$

$\Rightarrow \log_k a^{y^2+yz+z^2} = P(y^3-z^3)$ —(i)

$\therefore \log_k b = P(z-x)$

$\Rightarrow (z^2+zx+x^2)\cdot \log_k b = P(z-x)(z^2+zx+x^2)$

$\Rightarrow \log_k b^{z^2+zx+x^2} = P(z^3-x^3)$ —(ii)

$\therefore \log_k c = P(x-y)$

$\therefore \log_k c^{x^2+xy+y^2} = P(x^3-y^3)$ —(iii)

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(I) + (II) + (III):

$$\log_k a^{y^2+yz+z^2} + \log_k b^{z^2+zx+x^2} + \log_k c^{x^2+xy+y^2} = P(y^3-z^3+z^3-x^3+x^3-y^3)$$

$$\Rightarrow \log_k\left(a^{y^2+yz+z^2} \cdot b^{z^2+zx+x^2} \cdot c^{x^2+xy+y^2}\right) = P \times 0$$

$$= 0$$

$$= \log_k 1$$

$$\therefore a^{y^2+yz+z^2} \cdot b^{z^2+zx+x^2} \cdot c^{x^2+xy+y^2} = 1 \quad \text{(proved)}$$

$p = xy^{a-1}$, $q = xy^{b-1}$, $r = xy^{c-1}$ [40th BCS]

Prove : $\log p^{b-c} + \log q^{c-a} + \log r^{a-b} = 0$

$$L.S. = \log(xy^{a-1})^{b-c} + \log(xy^{b-1})^{c-a} + \log(xy^{c-1})^{a-b}$$

$$= \log\{x^{b-c} \cdot y^{(a-1)(b-c)}\} + \log\{x^{c-a} \cdot y^{(b-1)(c-a)}\} + \log\{x^{a-b} \cdot y^{(c-1)(a-b)}\}$$

$$= \log x^{b-c} + \log y^{(a-1)(b-c)} + \log x^{c-a} + \log y^{(b-1)(c-a)} + \log x^{a-b} + \log y^{(c-1)(a-b)}$$

$$= \log(x^{b-c} \cdot x^{c-a} \cdot x^{a-b}) + \log(y^{ab-ac-b+c} \cdot y^{bc-ab-c+a} \cdot y^{ac-bc-a+b})$$

$= 0$

$= \log x^0 + \log y^0$

$= \log 1 + \log 1$

$= 0 + 0$

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$$x^a \cdot x^b = x^{a+b}$$

$$x^a \div x^b = x^{a-b}$$

$$x^0 = 1$$

$$(x^a)^b = x^{ab}$$

$$\sqrt{x} = x^{\frac{1}{2}}$$

$$\sqrt[n]{x} = x^{\frac{1}{n}}$$

যদি $a^x = b^y = c^z$ এবং b^2=ac হয়, তবে প্রমাণ করুন যে, $\frac{1}{x} + \frac{1}{z} = \frac{2}{y}$

ধরি, $a^x = b^y = c^z = p$

$a = p^{\frac{1}{x}}$

$b = p^{\frac{1}{y}}$

$c = p^{\frac{1}{z}}$

আমরা, $b^2 = ac$

$\Rightarrow (p^{\frac{1}{y}})^2 = p^{\frac{1}{x}} \cdot p^{\frac{1}{z}}$

$\Rightarrow p^{\frac{2}{y}} = p^{\frac{1}{x}+\frac{1}{z}}$

$\therefore \frac{1}{x} + \frac{1}{z} = \frac{2}{y}$

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If $x^a = y^b = z^c$ and $xyz = 1$, then ab+bc+ca=?

ধরি, $x^a = y^b = z^c = K$

$\therefore x = K^{\frac{1}{a}}$

$y = K^{\frac{1}{b}}$

$z = K^{\frac{1}{c}}$

$\therefore K^{\frac{1}{a}} \cdot K^{\frac{1}{b}} \cdot K^{\frac{1}{c}} = 1$

$\Rightarrow K^{\frac{1}{a}+\frac{1}{b}+\frac{1}{c}} = K^0$

$\Rightarrow K^{\frac{bc+ca+ab}{abc}} = K^0$

$\Rightarrow \frac{bc+ca+ab}{abc} = 0$

$\therefore ab+bc+ca = 0$ (proved)

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সরল করুনঃ

$$\frac{\left(p+\frac{1}{q}\right)^m\left(p-\frac{1}{q}\right)^m}{\left(q+\frac{1}{p}\right)^m\left(q-\frac{1}{p}\right)^m}$$

$$=\left\{\frac{\left(p+\frac{1}{q}\right)\left(p-\frac{1}{q}\right)}{\left(q+\frac{1}{p}\right)\left(q-\frac{1}{p}\right)}\right\}^m$$

$$=\left\{\frac{\left(p^2-\frac{1}{q^2}\right)}{\left(q^2-\frac{1}{p^2}\right)}\right\}^m$$

$$=\left(\frac{\frac{p^2q^2-1}{q^2}}{\frac{p^2q^2-1}{p^2}}\right)^m$$

$$=\left(\frac{p^2q^2-1}{q^2}\times\frac{p^2}{p^2q^2-1}\right)^m$$

$$=\left(\frac{p^2}{q^2}\right)^m$$

$$=\left(\frac{p}{q}\right)^{2m}$$

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সরল করুনঃ $\frac{1}{1+x^{n-m}+x^{p-m}}+\frac{1}{1+x^{m-n}+x^{p-n}}+\frac{1}{1+x^{m-p}+x^{n-p}}$

$$= \frac{1}{1+\frac{x^n}{x^m}+\frac{x^p}{x^m}} + \frac{1}{1+\frac{x^m}{x^n}+\frac{x^p}{x^n}} + \frac{1}{1+\frac{x^m}{x^p}+\frac{x^n}{x^p}}$$

$$= \frac{x^m}{x^m+x^n+x^p} + \frac{x^n}{x^n+x^m+x^p} + \frac{x^p}{x^p+x^m+x^n}$$

$$= \frac{x^m+x^n+x^p}{x^m+x^n+x^p}$$

$$= 1$$

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সরল করুনঃ $\frac{a^{\frac{3}{2}}+ab}{ab-b^3}-\frac{\sqrt{a}}{\sqrt{a}-b}$

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

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

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

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

$$= \frac{a}{b(\sqrt{a}-b)} - \frac{\sqrt{a}}{\sqrt{a}-b}$$

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

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

$$= \frac{\sqrt{a}(\sqrt{a}-b)}{b(\sqrt{a}-b)}$$

$$= \frac{\sqrt{a}}{b}$$

$$a^{\frac{3}{2}} = a^{1+\frac{1}{2}}$$
$$= a^1 \cdot a^{\frac{1}{2}}$$
$$= a\sqrt{a}$$

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Prove that : $\left(\frac{a^p}{a^q}\right)^{p+q} \times \left(\frac{a^q}{a^r}\right)^{q+r} \times \left(\frac{a^r}{a^p}\right)^{r+p} = 1$

$= (a^{p-q})^{p+q} \times (a^{q-r})^{q+r} \times (a^{r-p})^{r+p}$

$= a^{p^2-q^2} \times a^{q^2-r^2} \times a^{r^2-p^2}$

$= a^{p^2-q^2+q^2-r^2+r^2-p^2}$

$= a^0$

$= 1$

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$$\left\{\frac{x^{(a-b)^2}}{x^{-3ab}}\right\}^{a-b} \times \left(\frac{x^{(b-c)^2}}{x^{-3bc}}\right)^{b-c} \times \left(\frac{x^{(c-a)^2}}{x^{-3ca}}\right)^{c-a} = ?$$

$$= \left(x^{a^2-2ab+b^2+3ab}\right)^{a-b}$$

$$= \left(x^{a^2+ab+b^2}\right)^{a-b}$$

$$= x^{a^3-b^3}$$

$$=$$

$$= x^0$$

$$= 1$$

$p = xy^{a-1}$, $q = xy^{b-1}$, $r = xy^{c-1}$ [40th BCS]

a) $\left(\frac{p}{q}\right)^c \times \left(\frac{q}{r}\right)^a \times \left(\frac{r}{p}\right)^b = ?$

$27^x = (\sqrt{3})^{4x+2}$ হলে x এর মান কত?

$$\Rightarrow (3^3)^x = \left(3^{\frac{1}{2}}\right)^{4x+2}$$

$$\Rightarrow 3^{3x} = 3^{\frac{4x+2}{2}}$$

$$\Rightarrow 3x = \frac{4x+2}{2}$$

$$\Rightarrow 3x = 2x+1$$

$$\Rightarrow 3x - 2x = 1$$

$$x = 1$$

$a^x = a^y$

$\Downarrow$

$x = y$

If $4^x + 4^{1-x} = 4$, then x=?

$\Rightarrow 4^x + \frac{4^1}{4^x} = 4$

$\Rightarrow a + \frac{4}{a} = 4$ [ধরি, $4^x = a$]

$\Rightarrow a^2 + 4 = 4a$

$\Rightarrow a^2 - 4a + 4 = 0$

$\Rightarrow a^2 - 2 \cdot a \cdot 2 + 2^2 = 0$

$\Rightarrow (a-2)^2 = 0$

$a = 2$

$\therefore 4^x = 2$

$\Rightarrow (2^2)^x = 2^1$

$\Rightarrow 2^{2x} = 2^1$

$\therefore 2x = 1$

$x = \frac{1}{2}$

সমাধান করুনঃ $8y^x - y^{2x} = 16$, $2^x = y^2$ — (i), (ii)

$8y^x - y^{2x} = 16$

$\Rightarrow y^{2x} - 8y^x = -16$

$\Rightarrow (y^x)^2 - 8y^x + 16 = 0$

$\Rightarrow a^2 - 8a + 4^2 = 0$ [$y^x = a$ ধরে]

$\Rightarrow (a-4)^2 = 0$

$\Rightarrow a = 4$

$\Rightarrow y^x = 4$

$\therefore y = 4^{\frac{1}{x}}$ — (iii)

$\therefore$ (ii) নং হতে,

$2^x = (4^{\frac{1}{x}})^2$

$\Rightarrow 2^x = 4^{\frac{2}{x}}$

$\Rightarrow 2^x = (2^2)^{\frac{2}{x}}$

$\Rightarrow 2^x = 2^{\frac{4}{x}}$

$\Rightarrow x = \frac{4}{x}$

$\Rightarrow x^2 = 4$

$\therefore x = \pm 2$

(iii) নং এ x এর মান বসিয়ে,

$x = 2$ হলে, $y = 4^{\frac{1}{2}}$

$= \sqrt{4}$

$y = 2$

$x = -2$ হলে, $y = 4^{-\frac{1}{2}}$

$= \frac{1}{\sqrt{4}}$

$y = \frac{1}{2}$

$(2, 2)$, $(-2, \frac{1}{2})$

যদি $x\sqrt[3]{a}+y\sqrt[3]{b}+z\sqrt[3]{c}=0$ এবং $a^2=bc$ হয়, তবে দেখান যে $ax^3+by^3+cz^3=3axyz$ ***

$\Rightarrow x\sqrt[3]{a}+y\sqrt[3]{b}=-z\sqrt[3]{c}$

$\Rightarrow (x\sqrt[3]{a}+y\sqrt[3]{b})^3=(-z\sqrt[3]{c})^3$

$\Rightarrow (x\sqrt[3]{a})^3+(y\sqrt[3]{b})^3+3\cdot x\sqrt[3]{a}\cdot\sqrt[3]{b}\cdot(x\sqrt[3]{a}+y\sqrt[3]{b})=-z^3c$

$\Rightarrow x^3a+y^3b+3xy\sqrt[3]{ab}\cdot(-z\sqrt[3]{c})=-z^3c$

$\Rightarrow ax^3+by^3-3xyz\sqrt[3]{abc}=-cz^3$

$\Rightarrow ax^3+by^3+cz^3=3xyz\cdot\sqrt[3]{ac^2}=3xyz\cdot\sqrt[3]{a^3}$

$=3axyz.$

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যদি $b=1+3^{\frac{2}{3}}+3^{\frac{1}{3}}$ হয়, তবে দেখান যে, $b^3-3b^2-6b-4=0$

$\Rightarrow b-1=3^{\frac{2}{3}}+3^{\frac{1}{3}}$

$\Rightarrow (b-1)^3=\left(3^{\frac{2}{3}}+3^{\frac{1}{3}}\right)^3$

$\Rightarrow b^3-3b^2+3b-1=\left(3^{\frac{2}{3}}\right)^3+\left(3^{\frac{1}{3}}\right)^3+3\cdot 3^{\frac{2}{3}}\cdot 3^{\frac{1}{3}}\cdot\left(3^{\frac{2}{3}}+3^{\frac{1}{3}}\right)$

$\Rightarrow b^3-3b^2+3b-1=3^2+3^1+3^{1+\frac{2}{3}+\frac{1}{3}}\cdot(b-1)$

$\Rightarrow b^3-3b^2+3b-1=9+3+3^2(b-1)$

$\Rightarrow b^3-3b^2+3b-1-9b-9-3+9=0$

$\Rightarrow b^3-3b^2-6b-4=0$

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Practice(Power)

1) $a = xy^{p-1}$, $b = xy^{q-1}$, $c = xy^{r-1}$, then prove : $a^{q-r}.b^{r-p}.c^{p-q} = 1$ [38th BCS]

2) $a - \{a^{-1} + (b^{-1} - a)^{-1}\}^{-1}$ $[a, b \neq 0 \ \& \ ab \neq 1]$ [20th BCS] Ans. a^2b

3) $[2 - 3(2 - 3)^{-1}]^{-1}$ = ? [13th BCS Preli] Ans. $\frac{1}{5}$

4) $(\frac{x^p}{x^q})^{p^2+pq+q^2} \times (\frac{x^q}{x^r})^{q^2+qr+r^2} \times (\frac{x^r}{x^p})^{r^2+rp+p^2} = ?$ Ans. 1

5) $x^{x\sqrt{x}} = (x\sqrt{x})^x$, Find the value of x. Ans. 9/4

6) $(\frac{a}{b})^{x-3} = (\frac{b}{a})^{x-5}$ x এর মান কত ?

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7) $4^x - 3(2^{x+2}) + 2^5 = 0, then\ x = ?$ Ans: 2 or 3 [38th BCS]

8) $i) log_x 324 = 4$ $ii) log_x \frac{1}{16} = -2$

$iii) \log_5^{(5x+45)} = 3$ $iv) \log_x \sqrt{\frac{1}{27}} = -\frac{3}{2}$, x = ? Find the value of x

9) $log_7(\sqrt[5]{7}.\sqrt{7}) - log_3\sqrt[3]{3} + log_4 2 = ?$

10) $2\log_{10} 5 + \log_{10} 36 - \log_{10} 9 = ?$

11) $7log_{10}\frac{10}{9} - 2log_{10}\frac{25}{24} + 3log_{10}\frac{81}{80} = ?$

12) $\log_{\sqrt{a}} b \times \log_{\sqrt{b}} c \times \log_c a = ?$

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(13) $\frac{ab\log_k(ab)}{a+b} = \frac{bc\log_k(bc)}{b+c} = \frac{ca\log_k(ca)}{c+a}$ হলে, প্রমাণ করুন যে,

$a^a = b^b = c^c$

(14) $a^2+b^2 = 7ab$ হলে, দেখান যে, $\log\left(\frac{a+b}{3}\right) = \frac{1}{2}(\log a + \log b)$

(15) a, b, c পরস্পর ভিন্ন ধনাত্মক অমূল্য সংখ্যা হলে, প্রমাণ করুন, $\log(1+ac) = 2\log b$

(16) $x = \log_a(bc)$, $y = \log_b(ca)$, $z = \log_c(ab)$ হলে,

প্রমাণ করুন যে, $\frac{1}{x+1} + \frac{1}{y+1} + \frac{1}{z+1} = 1$

(17) সরল করুন: (i) $\frac{2^{n+1} - 4.2^{n+1}}{2^{n+2} \div 2}$

(ii) $\frac{3^{m+1}}{(3^m)^{m-1}} \div \frac{9^{m+1}}{(3^{m-1})^{m+1}}$

(iii) $\frac{(a^2-b^{-2})^a (a-b^{-1})^{b-a}}{(b^2-a^{-2})^b (b+a^{-1})^{a-b}}$

(iv) $\sqrt[bc]{\frac{x^{\frac{b}{c}}}{x^{\frac{c}{b}}}} \times \sqrt[ca]{\frac{x^{\frac{c}{a}}}{x^{\frac{a}{c}}}} \times \sqrt[ab]{\frac{x^{\frac{a}{b}}}{x^{\frac{b}{a}}}}$

(18) $$\frac{\left(\frac{a+b}{b}\right)^{\frac{a}{a-b}} \times \left(\frac{a-b}{a}\right)^{\frac{a}{a-b}}}{\left(\frac{a+b}{b}\right)^{\frac{b}{a-b}} \times \left(\frac{a-b}{a}\right)^{\frac{b}{a-b}}} = ?$$

(19) প্রমাণ করুন: $$\frac{1}{1+a^{y-z}+a^{y-x}} + \frac{1}{1+a^{z-x}+a^{z-y}} + \frac{1}{1+a^{x-y}+a^{x-z}} = 1$$

(20) $a = 2 + 2^{\frac{2}{3}} + 2^{\frac{1}{3}}$ হলে, প্রমাণ করুন যে, $a^3 - 6a^2 + 6a - 2 = 0$

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