THETA TEAM QUESTIONS
FAMAT STATE CONVENTION 2002

QUESTION # 1 THETA BOWL

EVALUATE : $(8765432)(8765432) - (8765437)(8765427)$

QUESTION # 2 THETA BOWL

SOLVE for the value(s) of the ordered triple (x,y,z) which solves the following

$$x + y + z = 6$$
$$x(y + z) = 5$$
$$y(x + z) = 8$$

QUESTION # 3 THETA BOWL

Let A be the distance from the x-intercept of $4x - 3y = 12$ to the y-intercept of $5x + 4y = 12$
Let B be the units digit of $0! + 2! + 4! + 6! + 8! + 10!$

Find the value of $3a^2 - (b + 4)^2$

QUESTION # 4 THETA BOWL

Let B equal to sum of $2 - 1 + 4 - 3 + 6 - 5 + \ldots + 68 - 67$
Let D equal the sum of the roots taken 2 at a time of $x^4 - 7x^2 + 9x - 4 = 0$

Let F equal the determinant of $\begin{vmatrix} 3 & -1 & 4 \\ -4 & 2 & 5 \\ 2 & 0 & 13 \end{vmatrix}$

NOW determine the value of $B^2F - DF^2$

QUESTION # 5 THETA BOWL

SIMPLIFY: $(1 - i)^4$ express answer in $a + bi$ form

QUESTION # 6 THETA BOWL

SOLVE :
$$x + 3y - 2z = 12$$
$$3x - 2y + z = 15$$
$$2x + 5y - 5z = 27$$

THEN evaluate $\dfrac{x + y - z + 1}{5}$

QUESTION # 7 THETA BOWL

If $\log_{10} 2 = x$ and $\log_{10} 3 = y$, then find the value of $\dfrac{10^{x+y}}{10^{x-y}}$

QUESTION # 8 THETA BOWL

SOLVE for x : $\dfrac{a - x}{a - b} + \dfrac{a + x}{a + b} = \dfrac{a^2 - bx}{b^2 - a^2}$ given $a \neq \pm b$

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QUESTION # 9 THETA BOWL

Let $A = \left(1 + \sqrt{2} + \sqrt{3}\right)$ $B = \left(1 + \sqrt{2} - \sqrt{3}\right)$ $C = \frac{\sqrt{2}}{3}$

FIND (in simplest form): $(AB) \div C$

QUESTION # 10 THETA BOWL

If $[x]$ equals the value of the greatest integer less than or equal to x and $g(x,y)$= mean the arithmetic average of x and y

Let $f(x) = [3x - x^2]$ $h(x) = 2(x - 3)^2 - 5x$

THEN evaluate $g[f(5.63), h(-2)]$

QUESTION # 11 THETA BOWL

If $f(x) = 2x^2 - 5x + 4$ and $g(x) = 2f(x) - 7$

then find the exact distance from $(-2, g(-2))$ to $(3, g(3))$

QUESTION # 12 THETA BOWL

Let A = the positive root of $6x^2 + 13x - 28 = 0$
B = the hypotenuse of a right triangle with legs 40 and 42.
C = the radius of the circle $2x^2 + 2y^2 - 12x + 4y + 2 = 0$.

NOW find THE PRODUCT OF A , B , and C

QUESTION # 13 THETA BOWL

Let $3x^2 - 8x + 11$ be written as $b(x - 2)^2 + c(x - 2) + d$

Find the value of $b + c + d$

QUESTION # 14 THETA BOWL

If $|2x - y + 9| + |3x + 2y - 4| = 0$ then find $x + y$.

QUESTION # 15 THETA BOWL

Let S = the sum of the roots of $2x^3 - x^2 + 8x - 4 = 0$
P = the product of the roots of $4x^4 - 8x^3 + 12x - 20 = 0$

FIND : S + P