THETA TEAM ANSWERS

FAMAT CONVENTION 2002

(1) LET $x = 8765432$

SO $x-5 = 8765427$

$x+5 = 8765437$

NOW THE PRODUCT IS

$x^2 - (x-5)(x+5)$

$x^2 - (x^2 - 25)$

$\boxed{25}$

(2) From

$x+y+z=6$ we get $y+z = 6-x$

SUB. INTO 2nd EQ

$x(y+z) = 5$

$x(6-x) = 5$

$6x - x^2 = 5$

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

$0 = (x-5)(x-1)$

$\boxed{x=5}$ $\boxed{x=1}$

From

$x+y+z=6$ we get $x+z = 6-y$

SUB. INTO 3rd Eq.

$y(x+z) = 8$

$y(6-y) = 8$

$6y - y^2 = 8$

$0 = y^2 - 6y + 8$

$0 = (y-4)(y-2)$

$\boxed{y=4}$ $\boxed{y=2}$

Solution to $x + y + z = 6$ are

5	4	-3
5	2	-1
1	4	1
1	2	3

(3) $(3,0)$ to $(0,3)$

$a = \text{Distance} = 3\sqrt{2} \rightarrow 45^\circ\text{-}45^\circ\text{-}90^\circ\ \Delta$

$b = 7$ $\quad 1+2+24+720+40320+362800$

$3a^2 - (b+4)^2$

$3(18) - (11)^2 = \boxed{67}$

(4) $B = 34$

$D = 7$ coeff of x^2

$F = 0$ because

Row-3 is $2R_1 + R_2$

So $B^2F - DF^2 = \boxed{0}$

(5) Use Binomial Expansion

$1 + 4(-i) + 6(-i)^2 + 4(-i)^3 + (-i)^4$

$1 + -4i + -6 + 4i + 1$

$\boxed{-4}$ or $\boxed{-4 + 0i}$

(6) add all 3

$x + 3y - 2z = 12$

$3x - 2y + z = 15$

$2x + 5y - 5z = 27$

$6x + 6y - 6z = 54$

DIVIDE BY 6

$x + y - z = 9$

So $\dfrac{x+y-z+1}{5} = \boxed{2}$

(7) $\log_{10} 2 = x \rightarrow 2 = 10^x$

$\log_{10} 3 = y \rightarrow 3 = 10^y$

So $\dfrac{10^{x+y}}{10^{x-y}} = \dfrac{10^x(10^y)}{10^x \div 10^y}$

$\dfrac{2 \cdot 3}{2 \div 3} = 6 \div \dfrac{2}{3} = \boxed{9}$

(8) $\dfrac{a-x}{a-b} + \dfrac{a+x}{a+b} = \dfrac{bx - a^2}{a^2 - b^2}$

$\overset{M}{a^2-b^2}$ $(a-x)(a+b) + (a+x)(a-b) = bx - a^2$

$a^2 + ab - ax - bx + a^2 - ab + ax - bx =$

$2a^2 - 2bx = bx - a^2$

$3a^2 = 3bx$

$\boxed{\dfrac{a^2}{b} = x}$

(9) $AB = [(1+\sqrt{2}) + \sqrt{3}][(1+\sqrt{2}) - \sqrt{3}]$

$= (1+\sqrt{2})^2 - 3 = 1 + 2\sqrt{2} + 2 - 3$

$AB = 2\sqrt{2}$

$\dfrac{AB}{C} = \dfrac{2\sqrt{2}}{\sqrt{2}/3} = \boxed{6}$

(10) $f(5.63) = [1689 - 31.6969] = [-14.8$

$f(5.63) = -15$

$h(-2) = 2(-5)^2 - 70 = 60$

$g(-15, 60) = \boxed{\dfrac{45}{2}}$ or 22.5

(11) $f(-2) = 8 + +10 + 4 = 22$

$f(3) = 18 - 15 + 4 = 7$

$g(-2) = 2(22) - 7 = 37 \rightarrow (-2, 37)$

$g(3) = 2(7) - 7 = 7 \rightarrow (3, 7)$

$D = \sqrt{(-2-3)^2 + (37-7)^2} = \sqrt{925} = \boxed{5\sqrt{3}}$

(12) $(3x-4)(2x+7) = 0$

$\frac{4}{3}$ $\quad -\frac{7}{2}$ so $A = \frac{4}{3}$

$B = 58$ $\quad 20 - 21 - 29\ \Delta$ by 2

$x^2 - 6x + 9 + y^2 + 2y + 1 = -1 + 9 +$

$(x-3)^2 + (y+1)^2 = 9$ so $C =$

$ABC = \frac{4}{3}(58)(3) = \boxed{232}$

(13)

$b(x-2)^2 + c(x-2) + d$

$bx^2 - 4bx + 4b + cx - 2c + d$

$b = 3$ $\quad -4b + c = -8$

$-12 + c = -8$ $\quad c = 4$

$4b - 2c + d = 11$

$12 - 8 + d = 11$ $\quad d = 7$

So $b + c + d = \boxed{14}$

(14)

$2x - y + 9 = 0 \xrightarrow{M_2} 4x - 2y = -1$

$3x + 2y - 4 = 0$ $\quad 3x + 2y =$

$7x = -14$

$x = -2$

$-4 - y + 9 = 0$

$y = +5$

So $x + y = \boxed{3}$

(15) $S = \frac{1}{2} \rightarrow$ neg coeff of $x^2 \div$

$P = -5 \rightarrow$ constant $\div 4$

So $P + S = -4.5$