February Regional — Precalculus Team Test

1) Given that f(x) is even and g(x) is odd, use the following table to find $\frac{B}{A} + C + D - E$.

x	1	2	3	4
f(x)	2	-1	-5	1
g(x)	-6	3	7	2

A = $(f \circ g)(2)$
B = $(fg)(-3)$
C = $(g^{-1} \circ f)(1)$
D = $(f + g)(-4)$
E = $g^{-1}(3)$

2) Find the sum of the values of x, y, z that satisfy the following equations.
$3x + 2y - z = 7$
$4x - 2y + 5z = -9$
$x + 4y - 3z = 21$

3) Given the ellipse $16x^2 + 9y^2 - 64x + 18y - 71 = 0$. Find $\frac{A+B}{\pi}$, where
A = the area of the ellipse, and
B = the perimeter of the ellipse defined as $\pi(a + b)(3 - \frac{\sqrt{(3a+b)(a+3b)}}{a+b})$ where $a = minor\ radius$, and $b = major\ radius$.

4) How many times do the polar graphs of $r = 10$ and $r = 12\cos 6\theta$ intersect?

5) A = $\sin\frac{5\pi}{12}$ B = $\sin\frac{\pi}{12}$

C = $\cos\frac{7\pi}{12}$ D = $\cos\frac{\pi}{12}$

Find $AB + CD$

6) Find the area of the region bounded by the graphs $y \leq -|x - 5| + 10$ and $x^2 + y^2 - 10x - 6y \leq 15$.

7) Given $z_1 = 3cis(\frac{\pi}{3})$ and $z_2 = 8cis(\frac{\pi}{4})$
A = $z_1 * z_2$
B = z_1 / z_2
C = $(z_1)^3$
D = $\sqrt[3]{z_2}$
Find $\frac{B}{D} * |A| + C$

8) Add the numbers to the left of each of the statements that are true. Ex. If A and F are the only statements that are true, 5 + 0 = 5.

(5) A. The equation $2x^2 - 6xy + 3y^2 - 3x + 5y - 43 = 0$ describes an ellipse.
(4) B. The length of the latus rectum of the parabola $6(y - 2) = (x + 3)^2$ is 6.
(-3) C. A circle has an eccentricity of 1.
(-7) D. The area of an ellipse equals (major axis)*(minor axis)π.
(8) E. The focal radius in a hyperbola is greater than the major radius.
(0) F. Math is fun!

9) Find $\frac{A+B}{2} - \frac{C+D}{2}$ in simplest form.

A = $\sin^2 4 + \sec^2 6 + \tan^2 2 \cot^2 2$
B = $\cos^2 4 - \tan^2 6 + \sec 3 \cos 3$
C = $\csc^2 5 + (\cos^2 7 - \sin^2 7) \sec 14$
D = $\frac{2 \tan 9 \cot 18}{1 - \tan^2 9} - \cot^2 5$

10) Let:
A = $\log_2 5 + \log_4 3 - \log_8 4$
B = $\ln 5 - \ln 25 + \ln 50$
C = $5 \ln 1 - \ln 10 + \frac{\ln 9}{\ln 27}$
D = 2^{A+B+C}
Find e^D

11) Given vectors $u = < 5, 3, 1 >$ and $v = < -1, 2, 0 >$:
A = $|u \times v|$
B = $u \cdot v$
C = $|proj_v u|$
D = $|u + v|$
Find $\frac{A^2 D}{BC^2}$.

12) Given $\measuredangle ABC$, AC equals 8, CB equals 12, and $\angle C = \frac{\pi}{3}$ radians.
D = the length of AB
E = $\sin \angle B$
F = the area of the triangle
Find DEF.

13) Let A equal the acute angle made when the asymptotes of the hyperbola $25x^2 - 4y^2 - 150x - 32y + 61 = 0$ intersect. Find $\tan A$.

14) Let:
A = the coefficient of the first term in the expansion of $(5x + 1)^5$.
B = the coefficient of the fifth term in the expansion of $(2x - 3)^7$.
C = the number of distinct terms in the expansion of $(2x - 4y + 3z)^8$.
Find $\frac{B}{C} + A$.

15) Solve for z in terms of the other variables (x and y) and constant (k).
$\ln(k \sin z) + x + y = \ln(\cos z)$