February Regional **Algebra II Team Question 1**

Consider the following numbers: $-5, 0, 2, -\frac{1}{2}, -3, \frac{7}{8}, 14, -\frac{8}{3}, 2.43, 7\frac{1}{2}$

Let A be equal to the product of the natural numbers.
Let B be equal to the sum of the whole numbers.
Of the ten numbers listed, let C be equal to how many of them are rational.
Let D be equal to the sum of the integers.

Find $\frac{AC}{BD}$.

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February Regional **Algebra II Team Question 2**

For a linear function f, $f(-1)=3$ and $f(2)=4$. The domain of function, f, is all real numbers.

Let A be equal to $f(3)$.
Let B be equal to a such that $f(a)=10$.
Let C be equal to the y-intercept of $f(x)$.
Let D be equal to b such that $f^{-1}(b)=5$.

Find $\frac{AB}{CD}$.

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February Regional________________________________Algebra II Team Question 3

Find the area of the triangle defined by the solution to the system of inequalities: $\begin{cases} x - y \le 2 \\ x + 2y \ge 8 \\ y \le 4 \end{cases}$

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February Regional________________________________Algebra II Team Question 4

If $f(x) = x^2 + 6x + 7$, the coordinates of the vertex, (h, k), and the roots are A and B, find $\frac{h \bullet k}{A + B}$.

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February Regional______________________________Algebra II Team Question 5

Let A be equal to $\sqrt{2+\sqrt{2+\sqrt{2+...}}}$.

Let B be equal to $\sqrt{2-\sqrt{2-\sqrt{2-...}}}$.

Find $2A+3B$.

February Regional______________________________Algebra II Team Question 5

Let A be equal to $\sqrt{2+\sqrt{2+\sqrt{2+...}}}$.

Let B be equal to $\sqrt{2-\sqrt{2-\sqrt{2-...}}}$.

Find $2A+3B$.

February Regional______________________________Algebra II Team Question 6

Let A be equal to the number of unique possible rational values that could be zeros of $f(x) = x^3 + kx^2 + 5x + 4$ for *k*, an integer.

Let B be equal to the number of positive real zeros of $f(x) = x^3 + 2x^2 + 5x + 4$.

Let C be equal to the number of complex zeros of the polynomial equation $x^3 + 2x^2 + 5x + 4 = 0$.

Let D be equal to the sum of the coefficients of $g(x)$, given that g has integral coefficients, has the smallest degree, and has roots 2 and $2+i$.

Find the mean of A, B, C, and D.

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Find the mean of A, B, C, and D.

February Regional________________________________Algebra II Team Question 7

Let A equal the coefficient of the seventh term of the expansion of $(x-2y)^6$.

Let B equal the coefficient of the fourth term of the expansion of $(x+1)^8$.

Let C equal the coefficient of the first term of the expansion of $(2x+3y)^4$.

Find $\frac{A+B}{C}$.

February Regional________________________________Algebra II Team Question 7

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Let C equal the coefficient of the first term of the expansion of $(2x+3y)^4$.

Find $\frac{A+B}{C}$.

February Regional________________________________Algebra II Team Question 8

Let A be equal to the smallest solution of $3^{x^2+4x}=\frac{1}{27}$

Let B be equal to the largest solution of $3^{5x}\bullet 9^{x^2}=27$.

Let C be equal to the sum of the real solutions of $\log_4(x+3)+\log_4(x-3)=2$.

Find A+B+C.

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February Regional — Algebra II Team Question 9

Let A be equal to i^{122}.

Let B be equal to $\frac{3+i}{2-i}$

Let C be equal to $-i\sqrt{-144}$

Let D be equal to $(4+i)^2$

Find $A+B+C+D$ and write in simplified form.

February Regional — Algebra II Team Question 9

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Let C be equal to $-i\sqrt{-144}$

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Find $A+B+C+D$ and write in simplified form.

February Regional Algebra II Team Question 10

Given $f(x) = \frac{x^2+6x+5}{x^2+5x+4}$,

Let A be equal to the sum of all possible values of r for which $y = r$ is an asymptote of f.

Let B be equal to the sum of all possible values of p for which $x = p$ is an asymptote of f.

Let C be equal to the y-coordinate of the removable discontinuity.

Find $\frac{AC}{B}$.

February Regional Algebra II Team Question 10

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Find $\frac{AC}{B}$.

February Regional ______________________________ Algebra II Team Question 11

Given that $x = \log 3$ and $y = \log 5$, then let

A = the value of $\log 500$ in terms of x and/or y.

B = the value of k that makes $2x + 3y = \log(9k)$ true.

C = the value of $\frac{\log_2 5}{\log_2 10}$ in terms of x and/or y.

Give a simplified expression for $(A + B) - C$.

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February Regional **Algebra II Team Question 12**

Let A be the harmonic mean of 2, 4, 5, and 10.

Let B be the arithmetic mean of 2, 4, 5, and 10.

Let C be the geometric mean of 1, 3, and 9.

Find the product of A, B, and C.

February Regional **Algebra II Team Question 12**

Let A be the harmonic mean of 2, 4, 5, and 10.

Let B be the arithmetic mean of 2, 4, 5, and 10.

Let C be the geometric mean of 1, 3, and 9.

Find the product of A, B, and C.

February Regional Algebra II Team Question 13

Solve for x: $\frac{x-5}{x+3} \geq 5$

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February Regional______________________________Algebra II Team Question 14

Given that $2x^2 - 7x + 9$ is the dividend, $2x - 3$ is the quotient, and the remainder is 3, find the divisor, $A(x)$.

Let B be the remainder when $x^8 - 3x^5 + 4x^4 + 3x^3 + 2x - 1$ is divided by $x + 1$.

When $\frac{x^3 + (k-1)x + 3}{x+1}$ has remainder 5, *C* is the value of *k*.

Evaluate the function $A(x)$, where $x = B + C$.

February Regional______________________________Algebra II Team Question 14

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Evaluate the function $A(x)$, where $x = B + C$.

February Regional Algebra II Team Question 15

Let A be the largest of 3 consecutive odd integers whose sum is 51.

Let B be the smallest angle of a triangle whose angles are in a ratio of 2:3:4.

Let C be a two-digit number such that the sum of its digits is 9 and if 9 is added to the number, the digits are reversed.

Find $(A+B)-C$.

February Regional Algebra II Team Question 15

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