

Bergen County Math League

NO Calculators Permitted

Good Luck to You



Good Luck to All

Contest #4

2024-2025 12 minutes

Questions 1 & 2

4-1. Find all real values of x which satisfy: $|x - 2| = x^2$.

4-2. Find all ordered pairs of real numbers (x, y) which satisfy:

$$(x - 2y)(x - y) = 3, \text{ and}$$

$$(x - 2y)(x + y) = 7.$$

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12 minutes

Questions 3 & 4

4-3. A radius of a circle is 2 cm long. A point is selected at random from the interior of the circle. Find the probability that the point selected is further than 1 cm from the center of the circle.

4-4. If i is the imaginary unit and if a and b are real numbers, then the conjugate of the complex number $z = a + bi$ is represented by \bar{z} .
If $(z + \bar{z})z = 2 + 4i$, find the value of $a^2 + b^2$.

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Questions 5 & 6

- 4-5. Every digit in the k -digit decimal numeral representation of a number is a 3. If the number is divisible by 13, what is the smallest possible value of k ?
- 4-6. In a circle, \overline{AB} is a non-diameter chord, and P is a point on minor arc AB . Tangents to the circle at A and B intersect at point T . The distances from P to \overline{AB} , \overline{TA} and \overline{TB} respectively are a , b , and c . Write an **EQUATION** expressing c implicitly in terms of a and b .