Bergen County Math League
NO Calculators Permitted

Contest #4 **2024-2025** **Answers/Solutions**

4-1. **Answer:** $1, -2$

$x > 2 \Rightarrow x - 2 = x^2 \Rightarrow$ no real solutions

$x < 2 \Rightarrow 2 - x = x^2 \Rightarrow (x+2)(x-1) = 0 \Rightarrow x = 1$ or -2

4-2. **Answer:** $(5, 2), (-5, -2)$

Dividing, $\frac{x-y}{x+y} = \frac{3}{7} \Rightarrow y = \frac{2x}{5}$. Now substitute to get $(5, 2), (-5, -2)$.

4-3. **Answer:** $\frac{3}{4}$ or 75%

Probability = $\frac{4\pi - \pi}{4\pi} = \frac{3}{4}$

4-4. **Answer:** 5

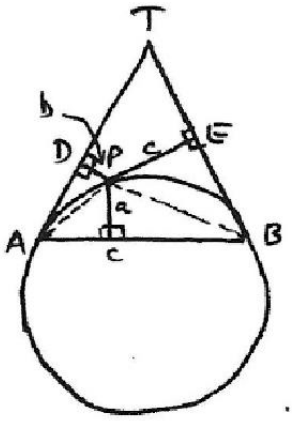
$(a + bi + a - bi)(a + bi) = 2(a^2 + abi) = 2(1 + 2i)$

$\therefore\ a^2 = 1$ and $ab = 2 \Rightarrow b = \pm 2 \Rightarrow a^2 + b^2 = 5$

4-5. **Answer:** 6

Set up the division $\frac{333\ldots}{13}$ until it comes out even. The answer is $k = 6$.

4-6. **Answer:** $c = \frac{a^2}{b}$



$\angle DAP \cong \angle PBA \Rightarrow right\ \Delta DAP \sim right\ \Delta CBP$ and $\frac{PD}{PC} = \frac{PA}{PB}$

But $\angle$PBE$\cong \angle PAB \Rightarrow right\ \Delta PBE \sim right\ \Delta PAC$ and $\frac{PC}{PE} = \frac{PA}{PB}$

$\therefore\ \frac{PD}{PC} = \frac{PC}{PE}$, or $\frac{b}{a} = \frac{a}{c}$.

Thus, $c = \frac{a^2}{b}$