

Nassau County Interscholastic Mathematics League

Contest #3

Answers must be in simplest exact form, unless otherwise noted.

2004-2005

No Calculators

Problems 13-14 Time limit: 10 minutes.

- 13) Moe knows that one of three people made a prank phone call. Each of them gives two statements. The “guilty” party made one true and one false statement. The innocent persons made two false statements. They said:  
Amanda: (1) If Hugg is guilty, then Kiss is guilty. (2) Hugg and Kiss are guilty  
Hugg: (1) Amanda’s statements are both true. (2) Amanda or Kiss are innocent.  
Kiss: (1) Amanda and Hugg are both guilty. (2) Hugg is innocent or Amanda is guilty.

Of Amanda, Hugg, and Kiss, which one or two are guilty?

14) . Evaluate the product  $\frac{2^2 - 1}{2^2 + 2} \cdot \frac{3^2 - 1}{3^2 + 3} \cdot \frac{4^2 - 1}{4^2 + 4} \cdots \frac{19^2 - 1}{19^2 + 19} \cdot \frac{20^2 - 1}{20^2 + 20}$  .

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Problems 15-16 Time limit: 10 minutes.

15. Find the exact distance between the parallel lines  $y = 2x + 11$  and  $y = 2x - 14$ . State your answer in simplified radical form.
16. The vertices of a triangle are  $A(1,3)$ ,  $B(4,7)$ , and  $C(8,-2)$  . Find, in slope-intercept form, the equation of the line containing the altitude from  $C$  to side  $\overline{AB}$  .
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Problems 17-18 Time limit: 10 minutes.

17. Solve for  $z$  over the set of complex numbers:  $z^2 + iz + 6 = 0$  . Solve for  $z$  over the set of complex numbers, where  $i$  is the imaginary unit,  $\sqrt{-1}$  .
18.  $ABED$  is a quadrilateral and point  $C$  is on  $\overline{BE}$  .  $ABCD$  is a parallelogram.  $\triangle CED$  is equilateral.  $AB = BC = 6$ . Find the area of  $ABED$ .
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Answers: 13) Hugg

14)  $\frac{1}{20}$

15)  $5\sqrt{5}$

16)  $y = \frac{-3}{4}x + 4$

17)  $2i, -3i$

18)  $27\sqrt{3}$