University of North Georgia

Sophomore Level Mathematics Tournament

April 11, 2015

Solutions for the Afternoon Team Competition

Round 1

If you give 1 cookie to the first friend, 2 cookies to the second friend, etc., after 19 friends you hav1 57.583ond frie

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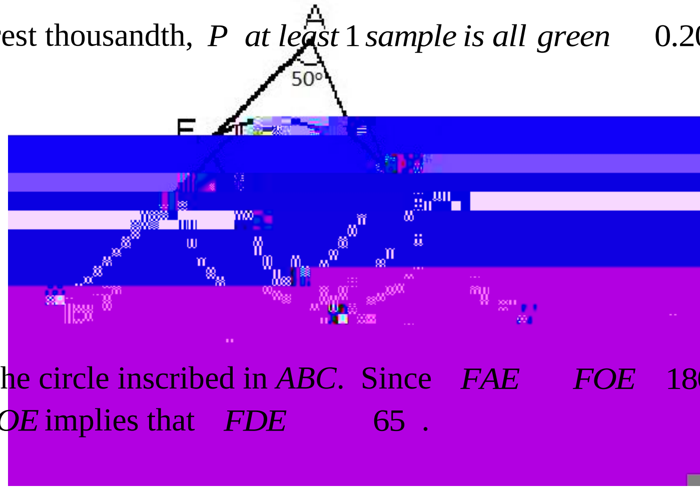
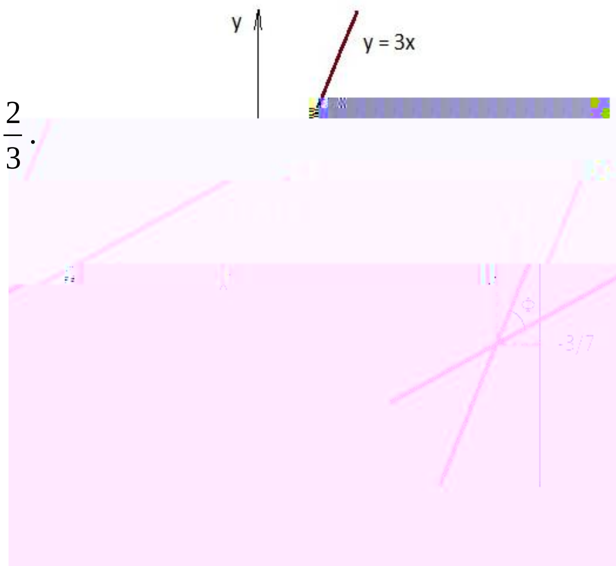
So, rounded to the nearest thousandth, P *at least* 1 *sample is all green* 0.200 .

Round 4



Let O be the center of the circle inscribed in ABC. Since FAE FOE 180 , then FOE 130 . Also, 2 FDE FOE implies that FDE 65 .

Round 5



For the first line: y $3x$ 0 , so y $3x$ and m_1 3 .

For the second line: $2x$ $3y$ 1 , so y $\frac{2}{3}x$ $\frac{1}{3}$ and m_2 $\frac{2}{3}$.

Using the difference formula for tangent, we have

$$\tan \quad \left|\frac{m_1 \quad m_2}{1 \quad m_1 m_2}\right| \quad \left|\frac{\frac{2}{3} \quad 3}{1 \quad 3 \quad \frac{2}{3}}\right| \quad \left|\frac{\frac{7}{3}}{3}\right| .$$

So $\tan$ $\frac{7}{9}$, then $\tan^{1}$ $\frac{7}{9}$ 37.87 .

Rounded to the nearest whole degree 38

Round 6

The equation of the line through $a, 0$ and $0, b$ is $\frac{x}{a}$ $\frac{y}{b}$ 1. Since 4, 3 is on the line, we have $\frac{4}{a}$ $\frac{3}{b}$ 1. From this equation we get $\frac{4 \quad 3}{}$ 1 and $4b$ $3a$ ab then ab $4b$ $3a$ 0 . Multiplying a 4 b 3 gives ab $4b$ $3a$ 12 . Since ab $4b$ $3a$ 0 , we have a 4 b 3 12

Round 7

Find the roots of the quadratic using the quadratic formula.

Adding the roots gives: $\tan \frac{P}{2}$ $\tan \frac{Q}{2}$ $\frac{b}{a}$

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Hence $A \quad \frac{1}{100}$.

<u>Round 10</u>

Since $ABCDE \quad 25000$ either $A \quad 1$ or $A \quad 2$ *and* $B \quad 1, 2,$ *or* 4.
Since $EDCBA$ is also even

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