

Team Contest Round 3

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All answers must be in reduced form; all formulas must be in closed form unless specified otherwise.

1 Algebra

1. 162
2. $\frac{1}{12}$
3. $-\frac{73}{121}$
4. 512
5. $64\frac{1}{256}$
6. $(n + \sqrt{20} - 4)^2, (t, t, t, t, \frac{3}{\sqrt{5}}t, \dots, \frac{3}{\sqrt{5}}t, 3t)$

2 Combinatorics

1. 30240
2. 285
3. 53
4. 0 for $i = 1, \frac{1}{n-1}$ else
5. $\binom{2012}{5}$
6. $\frac{2^{2n}}{\binom{2n}{n}}$

3 Geometry

1. 2
2. $\frac{\sqrt{3}}{6} - \frac{1}{18}\pi$
3. $\sqrt{51}$
4. 334
5. $\frac{\sqrt{3\sqrt{3}\pi}}{6}$
6. $\frac{64}{75}$

4 Number Theory

1. Yes
2. 5, 899, 999, 999, 999
3. 3, 11, 31
4. 443
5. 144
6. 5050
7. 979

5 Grab Bag

1. Geometry and Numbers
2. 2003
3. 18
4. 6203 (as of 8/17/2010)
5. 23
6. 10, 6, 1, 3, 17, 8