

1.6 Season 1 Episode 6, 10/25/2015

1. [MPG 2015] What is the area of the region bounded by the graphs of $y = |x + 2| - |x - 2|$ and $y = |x + 1| - |x - 3|$.
2. [AMC12 2000] One morning each member of Angela's family drank an 8-ounce mixture of coffee with milk. The amounts of coffee and milk varied from cup to cup, but were never zero. Angela drank a quarter of the total amount of milk and a sixth of the total amount of coffee. How many people are in the family?
3. Given a square \mathcal{S} and a (circular) disc \mathcal{D} . Determine if it is possible to dissect \mathcal{S} into two sets of (not necessarily connected) regions \mathcal{S}_1 and \mathcal{S}_2 and to dissect \mathcal{D} into two sets of (not necessarily connected) regions \mathcal{D}_1 and \mathcal{D}_2 such that \mathcal{S}_1 is similar to \mathcal{D}_1 and \mathcal{S}_2 is similar to \mathcal{D}_2 ?
4. [Ideamath San Jose Summer Program test, By Matthew Superdock] A robot moves around a plane tiled by equilateral triangles of unit side length. (Each triangle shares a side with three other triangles.) He begins at a vertex of one of the triangles and moves along sides of the triangles. How many paths of length 6 can he take such that after traveling 6 units, he is back at his starting position?
5. [USAMO 2004, by Ricky Liu] Show that it is not possible to dissect a square into two similar, but incongruent, polygons?