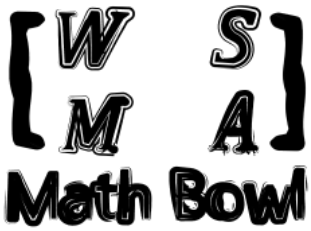
WSMA Math Bowl- March 7, 2015

Answer Sheet: HS Creativity Round

Total Points Earned:

/25



Problem 1

CHECK IF PROOF IS VALID

(For official use) Question 1 – Total Points Earned:	/ 5

Problem 2

CHECK IF PROOF IS VALID

(For official use) Question 2 – Total Points Earned:	/ 5

Problem 3

Create arbitrary coordinate xy coordinate axes. Draw a ray parallel to the x axis from the point with the lowest y-coordinate. Rotate the ray around the point with the lowest y-coordinate in a clockwise direction. The ray will hit 2n+1 points in the order of p1, p2, p3… p2n+1. When the ray hits pk, points pj for j<k will be left of the ray and points pi for i>k will be right of the ray. Connect the point with the lowest y coordinate to pn+1 so that exactly n points are to left of the line segment connecting the two and exactly n points are to the right.

(For official use) Question 3 – Total Points Earned:	/ 5

Problem 4

Sample: (4!+4-4+4^(4-4)). Accept any solution that uses exactly six 4's and evaluates to 25.

(For official use) Question 4 – Total Points Earned:	/ 5

Problem 5

(For official use) Question 5 – Total Points Earned:	/ 5

There exists no line cutting exactly 1 domino if every space is covered, because then all the dominos would end on the line except 1 would go through it. For this to be possible the parity of one of type of domino whose addition would shift the dominos to go through the line must be different for only 1 row/column. However, this is not possible because the domino is 1x2 or 2x1, not 1x1, so it cannot shift out in none of the adjacent columns. (If the adjacent column were offset similarly, the next adjacent column would have the same problem, et cetera, until the domino hits the boundary). Therefore, if each line intersects 2 dominos (the minimum number), there would be (5+5)*2 = 20 dominos cut. However, there are only 18 dominos, so at least one line cuts 0 dominos.