Problem 1. The horizontal line $y = c$ intersects the curve $y = 2x - 3x^3$ in the first quadrant as pictured below. Find $c$ so that the areas of the two shaded regions are equal. (54th Putnam, 1993.)

Problem 2. You have coins $C_1, C_2, \ldots, C_n$. For each $k$, coin $C_k$ is biased so that, when tossed, it has probability $\frac{1}{2k + 1}$ of falling heads. If the $n$ coins are tossed, what is the probability that the number of heads is odd? Express the answer as a rational function of $n$. (62nd Putnam, 2001.)

Problem 3. The hands of a clock have lengths 3 and 4. Find the distance between the tips of the hands when that distance is increasing most rapidly. (44th Putnam, 1983.)

Problem 4. Given that $x_1, x_2, \ldots, x_n$ is a permutation of the numbers 1, 2, \ldots, $n$, find the largest possible value, as a function of $n$, of $x_1x_2 + x_2x_3 + \cdots + x_{n-1}x_n + x_nx_1$. (57th Putnam, 1996.)