C. Drawing all such diagonals P_jP_{j+2} creates vertices of a smaller regular n-gon whose exterior angles have measure 360/n

Team Round:

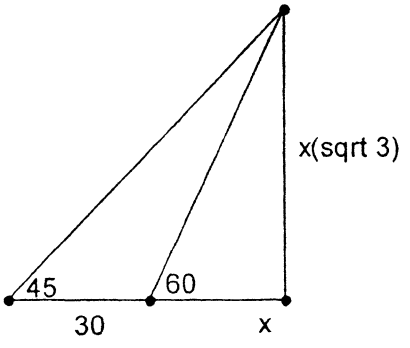
A. $\left((1+i)^2\right)^{1003} = (2i)^{1003} = 2^{1003}i^{1003} = -2^{1003}i = 0 + -2^{1003}i$ so a>b

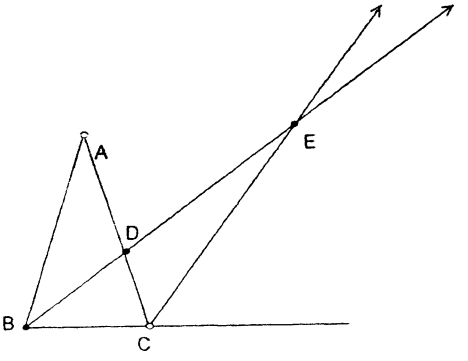
B. Multiply all 3 eqtns: A:D = 200:672 = 25:81. Multiply second and third eqtn gives B:D = 100:216 = 25:54(BD+AD)/AB = D/A + D/B = 54/25+81/25=135/25 so reciprocal is 35/135 = 5/27.

C. Draw hts from ends of shorter base, solve $x^2 + h^2 = 1$ $(3-x)^2 + h^2 = 9$ so $x = 1/6$ and $h = \frac{\sqrt{35}}{6}$ and area is $\frac{7}{12}\sqrt{35}$

D. Since $12x^2 + 14x - 40 = (3x-4)(4x+10)$ half the perimeter is $(3x-4)+(4x+10) = 97$ so x = 13 and dimensions are 35 by 62.

E. $30 + x = x\sqrt{3}$ so $x = \frac{30}{\sqrt{3}-1} = \frac{30(\sqrt{3}+1)}{3-1} = 15\sqrt{3} + 15$ see left sketch





F. If m∠A = x m∠ABD=x so angles ABC and BCA are each 2x so 5x=180 x = 36. m∠EBC=36, m∠BCE=72 + 108/4=126 so m∠BEC=18. See above sketch