2. In a plane are n points, no four lying on one circle, and through each set of three is described a circle. Find the number of intersections of these c rcles exclusive of the original points, each circle being supposed to cut every other circle.

We have ${}^nC_3$ circles.

Now, if each circle would cut every other circle in different points we would have $\frac{{}^nC_3 \times ({}^nC_3 - 1) \times 2}{2}$ intersections; but each one of the n points is on ${}^{n-1}C_2$ or $\frac{(n-1)(n-2)}{1.2}$ circles, and, therefore, counts as $\frac{(n-1)(n-2)}{1.2} C_2$ intersections.

$\therefore$ number of intersections exclusive of the original points is

$$\frac{{}^nC_3 \times ({}^nC_3 - 1) \times 2}{2} - n \left\{ \frac{(n-1)(n-2)}{1.2} C_2 \right\}.$$

3. Sum to 2n terms the series:

$1^2 - 3^2 + 5^2 - 7^2 + \ldots\ldots$

$S = (1^2 - 3^2) + (5^2 - 7^2) + (9^2 - 11^2) \ldots\ldots$

$= (1+3)(1-3) + (5-7)(5+7) + (9-11)(9+11) \ldots\ldots$ to n terms

$= -2[4 + 12 + 20 \ldots\ldots$ to n terms]

$= -2 \frac{n}{2} \left\{ 2.4 + \overline{n-1}.8 \right\}$

$= -8n^2$

4. Between what two positive integers does the value of $(\sqrt{29}+5)^{2n}$ lie?

$$(\sqrt{29}+5)^{2n} = (29^{\frac{1}{2}}+5)^{2n} = 29^n + 2n.29^{\frac{2n-1}{2}}.5 + \frac{2n.2n-1}{1.2} 29^{\frac{2n-2}{2}}.5^2 + \ldots\ldots 5^{2n}$$

$$(\sqrt{29}-5)^{2n} = (29^{\frac{1}{2}}-5)^{2n} = 29^n - 2n\,29^{\frac{2n-1}{2}}.5 + \frac{2n.(2n-1}{1.2} 29^{\frac{2n-2}{2}}.5^2 + \ldots\ldots 5^n$$

$$\therefore (\sqrt{29}+5)^{2n} + (\sqrt{29}-5)^n = 2\left\{ 29^n + \frac{2n(2n-1)}{1.2}.29^{n-1}.5^2 + \ldots\ldots 5^{2n} \right\}$$

$=$ I $=$ a positive integer $\therefore (\sqrt{29}+5)^{2n} = I - (\sqrt{29}-5)^{2n}$

$= I -$ a positive proper fraction if n is positive

$\therefore$ $(\sqrt{29}+5)^{2n}$ lies between I $-$ 1 and I.

---

## MAGAZINE AND BOOK REVIEWS.

"The Mystery of Evil," by John Fiske, is the opening article in the April number of the *Atlantic Monthly*.

It is a serious and vital consideration of the more perplexing side of existence which will afford to many the effect of reconciliation with present unexplained conditions. "Cromwell; A Tricentenary Study," by Samuel Harden Church, and "The Solar System in the Light of Recent Discoveries," by T. J. J. See, are both articles of weight and interest of that excellent kind that the readers of the *Atlantic* have been encouraged to expect. There are two short stories, "Love and a Wooden Leg," by W. R. Lighton, and "A March Wind," by Alice Brown. This latter is written and conceived in the delicate and lovely manner well-known to readers of better American literature. Mrs. Howe's "Reminiscences" are continued, and so are Prof. James' "Talks to Teachers on Psychology."

The art department of *The Century Magazine* is especially fine and pleasing this month. The frontispiece is Stable Interior, painted by George Morland. There is an example of