Nederlandse Wiskunde Olympiade voor Bedrijven

Friday, 24 January 2020

- Available time: 20 minutes.
- For this "uitsmijter" only an answer is required, no calculation or proof. A correct and complete answer is worth 10 points. For an answer that is not complete or not completely correct you may also get some points.
- Formula sheets and calculators are not allowed. You can only use a pen, compass, ruler or set square and of course your mental skills.
- Good luck!

For the contest managers: | Score first round: | Score uitsmijter:

Name:

Company:

Uitsmijter

Please write your answers to these questions in an exact form and simplified as much as possible, such as $\frac{1234}{5}$ or 6^{333}.

(a) The sequence $a_1, a_2, a_3, \ldots$ is defined as follows: $a_1 = 0$, and each next term in the sequence can be found by using $n = 1, 2, 3, \ldots$ in the formula

$$a_{n+1} = a_n + 2n - 3.$$

So $a_2 = a_1 + 2 - 3$, $a_3 = a_2 + 4 - 3$, and so on.
Determine a_{1001}.

(b) The sequence $b_1, b_2, b_3, \ldots$ is defined as follows: $b_1 = 1$, and each next term in the sequence can be found by using $n = 1, 2, 3, \ldots$ in the formula

$$b_{n+1} = \frac{n+2}{n} \cdot (b_1 + b_2 + \ldots + b_n),$$

where between the parentheses the sum of all previous terms in the sequence is written.
So $b_2 = \frac{3}{1} \cdot b_1$, $b_3 = \frac{4}{2} \cdot (b_1 + b_2)$, and so on.
Determine b_{1001}.

Answer:

(a)

(b)