SEQUENCES AND POLYNOMIALS TEST

3º ESO

Exercise 1: (1.5 ptos) Find the general term of the following sequences:

a) $\left\{\frac{2}{2}, \frac{5}{3}, \frac{10}{4}, \frac{17}{5}, \frac{26}{6}, \frac{37}{7} \cdots\right\} \rightarrow a_n = \frac{n^2+1}{n+1}$

b) $\{5, 12, 19, 26, 33, 40 \cdots\} \rightarrow a_n = 5+7(n-1)$

c) $\{3, 12, 48, 192, 768, 3072 \cdots\} \rightarrow a_n = 3 \cdot 4^{n-1}$

Exercise 2: (1 pto) In an AP we know that $a_{15} = 31$ and $a_{57} = 115$. Find the general term, a_{75} and the sum of the first one hundred and twenty five terms.

$a_n = 3+2(n-1)$ $\quad a_{75} = 151$ $\quad S_{125} = 15875$

Exercise 3: (1 pto) In a GP we know that $a_1 = 5$ and $a_{10} = 98415$. Find the general term and the sum of the first fifty terms. $a_n = 5 \cdot 3^{n-1}$ $\quad S_{50} = 1.79 \cdot 10^{24}$

Exercise 4: (1 pto) A regular man has a total of 56000000 of sexual cells in his sperm but, due to the contamination in the air, the number has been decreasing by 2.65% during the past years. What will the number of sexual cells be 30 years from now? $a_{30} = 25\,699\,859$ sexual cells, more or less

Exercise 5: (0.75 ptos) A worker has a salary of 20000€/year, but he gets an increase of 200€ every year. What will his salary be ten years later? $a_{10} = 21800€$

Exercise 6: (1 pto) Work out using quadratic multiplication formulas:

a) $\left(3y^4 - 2xy^3\right)^2 = 9y^8 - 12xy^7 + 4x^2y^6$ $\quad$ b) $\left(5z^7 - 3\right)\left(5z^7 + 3\right) = 25z^{14} - 9$

Exercise 7: (1 pto) Simplify:

a) $\frac{x^2 - 10x + 25}{x^2 - 25} = \frac{x-5}{x+5}$ $\quad$ b) $\frac{x^2 - 1}{x^2 + 2x + 1} = \frac{x-1}{x+1}$

Exercise 8: (1 pto) Take out common factors:

a) $20a^5 - 25a^4 + 35a^3 - 5a^2 = 5a^2\left(4a^3 - 5a^2 + 7a - 1\right)$

b) $a^3b^2c + a^4b^3c^2 + a^5b^4c^3 = a^3b^2c\left(1 + abc + a^2b^2c^2\right)$

Exercise 9: (1.75 ptos) Given the polynomials $P(x) = 2x^3 - 5x^2 - x + 4$, $Q(x) = -x^3 + 4x^2 - x - 3$ and $R(x) = x^2 - 2x$, work out:

a) $P - Q = 3x^3 - 9x^2 + 7$ $\quad$ b) $P \cdot R = 2x^5 - 9x^4 + 9x^3 + 6x^2 - 8x$ $\quad$ c) $R^2 = x^4 - 4x^3 + 4x^2$