Probleme propuse:

1. Efectuaţi următoarele calcule:
   a) $\dfrac{\frac{2}{1}}{\frac{1}{3}}$ b) $\dfrac{\frac{1}{3}}{\frac{2}{1}}$ c) $\dfrac{\frac{1}{2}}{\frac{3}{1}}$ d) $\dfrac{\frac{2}{1}}{\frac{1}{3}}$ e) $\dfrac{\frac{3}{4}}{\frac{4}{5}}$ f) $\dfrac{\frac{3}{4}}{\frac{5}{4}}$ g) $\dfrac{\frac{4}{3}}{\frac{4}{5}}$ h) $\dfrac{\frac{4}{3}}{\frac{5}{4}}$
2. Efectuaţi următoarele calcule:
   a) $\dfrac{\frac{2}{1}+\frac{1}{2}}{\frac{1}{3}+\frac{3}{1}}$ b) $\dfrac{\frac{1}{3}+\frac{1}{2}}{\frac{2}{1}+\frac{1}{3}}$ c) $\dfrac{\frac{1}{2}-\frac{1}{3}}{\frac{3}{1}-\frac{1}{2}}$ d) $\dfrac{\frac{2}{1}\cdot\frac{1}{3}}{\frac{1}{3}:\frac{1}{2}}$ e) $\dfrac{\frac{3}{4}+\frac{4}{3}}{\frac{4}{5}-\frac{5}{4}}$ f) $\dfrac{\frac{3}{4}-\frac{3}{5}}{\frac{5}{4}:\frac{5}{3}}$ g) $\dfrac{\frac{4}{3}:\frac{4}{5}}{\frac{4}{5}:\frac{4}{3}}$ h) $\dfrac{\frac{4}{3}\cdot\frac{5}{4}}{\frac{5}{4}:\frac{3}{4}}$
3. Rezolvaţi ecuaţiile
   a) $4x-8=0$ b) $4x+8=0$ c) $3x+9=7x-15$ d) $2x-3=5x+6$
4. Rezolvaţi inecuaţiile
   a) $3x-6<0$ b) $5x+15\geq 0$ c) $4x+3\leq 3x-5$ d) $4x-7>5x-15$
5. Rezolvaţi următoarele ecuaţii de gradul al II-lea:
   a) $x^2+5x+4=0$ c) $x^2-4x+4=0$ e) $x^2+4x+5=0$ g) $2x^2+7x+3=0$
   b) $x^2-5x+4=0$ d) $x^2+4x+4=0$ f) $x^2+2x+2=0$ h) $4x^2+4x+1=0$
6. Efectuaţi următoarele calcule algebrice:
   a) $(x+2)^2$ c) $(2x+1)^2$ e) $(x-y)^2$ g) $(x+y-z)^2$
   b) $(x-3)^2$ d) $(3x-2)^2$ f) $(x+3y)^2$ h) $(4x-5y+1)^2$
7. Efectuaţi următoarele calcule algebrice:
   a) $(x+2)^3$ e) $(x+2)^4$ i) $(x+2)^5$ m) $(x-y)^7$
   b) $(x-3)^3$ f) $(x-3)^4$ j) $(x-3)^5$ n) $(x+3y)^8$
   c) $(2x+1)^3$ g) $(2x+1)^4$ k) $(2x+1)^5$ o) $(x-1)^{100}$
   d) $(3x-2)^3$ h) $(3x-2)^4$ l) $(3x-2)^5$ p) $(x+1)^{2024}$
8. Scrieţi ca sumă sau diferenţă de pătrate perfecte
   a) x^2+2x+5 c) x^2+4x+3 e) x^2-2x+y^2+6y g) $x^2+4y^2+2x+4y+4xy$
   b) x^2+x+3 d) $x^2+6x+10$ f) $x^2+2xy-3y^2$ h) $x^2+y^2-6x+6y-2xy$
9. Forţaţi factor comun cea mai mare putere a lui n din următoarele expresii:
   a) n^2+n; b) n^7-n^5; c) $2n^5+4n^3+n^2+1$; d) $5n^3-4n^2+n+3$.
10. Simplificaţi prin cea mai mare putere a lui n din următoarele fracţii algebrice:
    a) $\dfrac{3-n^3}{n^2-6n+5}$ c) $\dfrac{3-n^3}{4-n^4}$ e) $\dfrac{(n+1)^2-n^2}{3n+4}$ g) $\dfrac{(n-1)^2-3n^5}{(2n+5)^3}$
    b) $\dfrac{n^2-6n+5}{3-n^2}$ d) $\dfrac{n^2-5n+4}{n^3-2n+1}$ f) $\dfrac{(2n+3)^2-n^3}{2n^4+3}$ h) $\dfrac{(n-1)^5-3n^2}{(2n+5)^4}$
11. Comparaţi următoarele fracţii algebrice:
    a) $\dfrac{2n+1}{3n-2}\ \square\ \dfrac{2}{3}$ b) $\dfrac{2n+1}{3n-2}\ \square\ \dfrac{2n-1}{3n+2}$ c) $\dfrac{4n+1}{5n+3}\ \square\ \dfrac{4n+2}{5n+2}$ d) $\dfrac{n^2+n}{n^3+1}\ \square\ \dfrac{3n+2}{3n^2+1}$
12. Dacă x_n este termenul general al unui şir de numere reale dat de regula următoare, unde $n\geq 1$, scrieţi termenul x_{n+1} şi calculaţi $\dfrac{x_{n+1}}{x_n}$:
    a) $x_n=n^2$
    b) $x_n=2^n$
    c) $x_n=n^2+n+1$
    d) $x_n=n^2-n+1$
    e) $x_n=n^3-3^n$
    f) $x_n=n^3-n^2+1$
    g) $x_n=n^3+n^2+1$
    h) $x_n=n^5+3n+4$
    i) $x_n=\dfrac{1}{n+2}$
    j) $x_n=3-\dfrac{1}{n}$
    k) $x_n=\dfrac{n+1}{n+2}$
    l) $x_n=\dfrac{3-n}{2n+5}$
    m) $x_n=\dfrac{n^2+1}{n^3+1}$
    n) $x_n=\dfrac{n^2}{2^n}$
    o) $x_n=\dfrac{n^3}{2^n}$
    p) $x_n=\dfrac{4^{n-1}}{(n+2)^3}$
    q) $x_n=\dfrac{3^n}{n^3+n^2}$
    r) $x_n=\dfrac{n^2}{n!+1}$
    s) $x_n=\dfrac{2^n\cdot n!}{n^2}$
    t) $x_n=\dfrac{3^n\cdot n^3}{(n+3)!}$
    u) $x_n=\dfrac{n^2\cdot(2n)!}{2^n}$