1) Folosind definitia convergentei unei serii sa se stabileasca natura urmatoarelor serii numerice, iar in caz de convergenta sa se calculeze suma.

$$\sum_{n=0}^{\infty} \frac{1}{n^2+3n+2}$$
$$\sum_{n=0}^{\infty} \ln\left(1-\frac{1}{n^2}\right)$$
$$\sum_{n=0}^{\infty} \ln\frac{n+1}{n}$$
$$\sum_{n=1}^{\infty} \frac{1}{\sqrt{n}+\sqrt{n+1}}$$
$$\sum_{n=1}^{\infty} \frac{3^n+(-2)^{n+1}}{6^n}$$

2) Studiati convergenta seriilor

$$\sum_{n=0}^{\infty} \frac{1}{3^n+4^n}$$
$$\sum_{n=0}^{\infty} 2^n \sin\frac{\pi}{4^n}$$
$$\sum_{n=0}^{\infty} \frac{n+1}{n^3+2n+1}$$
$$\sum_{n=0}^{\infty} \frac{\sqrt{n}}{n+1}$$
$$\sum_{n=0}^{\infty} (\sqrt{n^2+n}-n)$$
$$\sum_{n=0}^{\infty} \frac{n^2}{3^n}$$
$$\sum_{n=0}^{\infty} \left(\frac{n+1}{n}\right)^{n^2} \cdot a^n, a>0$$

$$\sum_{n=0}^{\infty}(-1)^n\frac{1}{\sqrt{n(n+1)}}$$
$$\sum_{n=1}^{\infty}\sin\frac{1}{n\sqrt{n}}$$
$$\sum_{n=1}^{\infty}\frac{n!}{(a+1)(a+2)\cdots(a+n)}, a\in\mathbb{R}$$
$$\sum_{n=1}^{\infty}\frac{\sqrt{n+2}-\sqrt{n}}{n}$$
$$\sum_{n=1}^{\infty}\left(\frac{2n+1}{3n+2}\right)^{\frac{n^2}{n+2}}$$
$$\sum_{n=1}^{\infty}\frac{n!}{n^n}$$
$$\sum_{n=1}^{\infty}\frac{\ln n}{2n^3+1}$$

3) Consideram urmatoarele multimi din $\mathbb{R}^2$

$$A=[0,1]\times(0,2),\quad B=\{(x,y)\in\mathbb{R}^2 : x^2+y^2<9\}, C=\{1\}\times\mathbb{R}$$

Care dintre aceste multimi sunt deschise ? Care dintre aceste multimi sunt inchise ? Care dintre aceste multimi sunt compacte ? Justificati raspunsul !

4) Consideram urmatoarele multimi din $\mathbb{R}^3$

$$A=[0,1]\times 0,2\times[1,3],\quad B=\{(x,y,z)\in\mathbb{R}^3 : x^2+y^2+z^2\geq 9\}, C=\{(x,y,z)\in\mathbb{R}^3 : x+y+z>9\}$$

Care dintre aceste multimi sunt deschise ? Care dintre aceste multimi sunt inchise ? Care dintre aceste multimi sunt compacte ? Justificati raspunsul !

5) Sa se studieze continuitatea functiilor

1) $f(x)=\begin{cases} x^2 & \text{daca } -1\leq x\leq 1\\ |x| & \text{daca } |x|>1\end{cases}$ 2) $f(x)=\begin{cases} 0 & \text{daca } x\in\mathbb{Q}\\ 1 & \text{daca } x\notin\mathbb{Q}\end{cases}$

3) $f(x)=\begin{cases} x+\ 2 & \text{daca } x<0\\ x^2+1 & \text{daca } x\geq 0\end{cases}$

6) Studiati continuitatea uniforma a urmatoarelor functii:

1) $f:(0,1)\to\mathbb{R},\quad f(x)=\sqrt{x}$ 2) $f:\mathbb{R}\to\mathbb{R},\quad f(x)=2x+1$

3) $f:(0,1)\to\mathbb{R},\quad f(x)=\dfrac{1}{x}$

7) Sa se studieze convergenta simpla si uniforma a urmatoarelor siruri de functii:

1) $f_n:(0,1)\to\mathbb{R},\quad f_n(x)=\dfrac{1}{nx+1}$

2) $f_n:[-1,1]\to\mathbb{R},\quad f_n(x)=\dfrac{x}{1+n^2x^2}$

3) $f_n:[0,1]\to\mathbb{R},\ f_n(x)=\dfrac{x^n}{1+x^{2n}}$

4) $f_n:[0,1]\to\mathbb{R},\ f_n(x)=\dfrac{x}{x+n}$

5) $f_n:\mathbb{R}\to\mathbb{R},\ f_n(x)=\dfrac{x^2+nx}{n}$

6) $f_n:\mathbb{R}\to\mathbb{R},\ f_n(x)=\dfrac{nx^2}{1+nx^2}$

7) $f_n:[0,1]\to\mathbb{R},\quad f_n(x)=\dfrac{nx}{1+n^2x}$