GROUP I-219ia, KH-219 ae,219iae,219,iбe,219iвe

Individual Tasks

on Topic Numerical and Functional Series

Deadline on 29 May

Card N1

1. Investigate for convergence the following series:

a) $\sum\limits_{n=1}^{\infty}\frac{5}{2^n+3^n}$; **b)** $\sum\limits_{n=1}^{\infty}\frac{n}{\sqrt{n^8+3n^2}}$; **c)** $\sum\limits_{n=1}^{\infty}\frac{n^2}{4^n}$;

d) $\sum\limits_{n=1}^{\infty}\operatorname{arc\,tan}\frac{n+1}{\left(n^3+1\right)^{3/2}}$; **e)** $\sum\limits_{n=1}^{\infty}\frac{1}{2^n}\left(1+\frac{1}{n}\right)^{n^2}$; **f)** $\sum\limits_{n=5}^{\infty}\frac{1}{(2+n)\ln(n-3)}$;

g) $\sum\limits_{n=1}^{\infty}\frac{(3n-1)}{(2n+1)!}$.

2. Investigate for absolutely and conditionally convergence the alternating series $\sum\limits_{n=1}^{\infty}\frac{(-1)^n}{n\sqrt[3]{2n+1}}$.

3. Find the interval for convergence of the power series

$$u_n=\frac{3^n\, n!\, x^n}{(n+1)^2}$$

Card N2

1. Investigate for convergence the following series:

a) $\sum\limits_{n=1}^{\infty}\frac{n^2-2}{4^n}$; **b)** $\sum\limits_{n=1}^{\infty}\frac{n}{\sqrt{n^8+3n^2}}$, **c)** $\sum\limits_{n=1}^{\infty}\left(\frac{2n+3}{n+2}\right)^{2n}$,

d) $\sum\limits_{n=1}^{\infty}\frac{1}{\sqrt{n+1}}\arcsin\frac{n+2}{n^2+3}$, **e)** $\sum\limits_{n=1}^{\infty}\left(\frac{2n+5}{5n+2}\right)^n$

, **f)** $\sum_{n=1}^{\infty}\frac{1}{(n+1)\ln(n+2)}$, **g)** $\sum_{n=1}^{\infty}\frac{(n+2)}{(n+1)!}$.

2. Investigate for absolutely and conditionally convergence the alternating series $\sum_{n=1}^{\infty}(-1)^n\frac{n+4}{\sqrt{n^3}}$.

3. Find the interval for convergence of the power series

$$u_n=\frac{(-1)^n\sqrt[3]{n}(x-2)^n}{(n+1)}$$

Card N3

1. Investigate for convergence the following series:

a) $a_n=\frac{2^n}{5^n+2n}$; **b)** $\sum_{n=1}^{\infty}\frac{\arctan\frac{n^2}{2n^3}}{n^4+3}$;

c) $\sum_{n=1}^{\infty}\frac{(3n-2)}{7^n n!}$; **d)** $\sum_{n=1}^{\infty}\frac{1}{n^2}\tan\frac{1}{n}$;

e) $\sum_{n=1}^{\infty}\frac{2n+7}{(2n+3)!}3^n$; **f)** $\sum_{n=1}^{\infty}\left(\frac{2n}{3n-1}\right)^{2n}$; **g)** $\sum_{n=2}^{\infty}\frac{1}{(2n-3)\ln(2n+1)}$.

2. Investigate for absolutely and conditionally convergence the alternating series $\sum_{n=1}^{\infty}(-1)^n\frac{\sin\frac{\pi}{2\sqrt{n}}}{\sqrt{3n+1}}$.

3. Find the interval for convergence of the power series

$$u_n=\frac{x^n 2^n}{\sqrt{3^n(2n-1)}}$$

Card N4

1. Investigate for convergence the following series:

a) $a_n = \dfrac{5^n}{(3^n+1)^2}$; **b)** $\sum_{n=1}^{\infty} n \sin \dfrac{2}{n^3}$;

c) $\sum_{n=1}^{\infty} \dfrac{3^n n^5}{(4n+3)!}$; **d)** $\sum_{n=1}^{\infty} \dfrac{3n}{3^{n-1}+5n+41}$;

e) $\sum_{n=1}^{\infty} \left(\dfrac{3n+1}{15n-2}\right)^n$; **f)** $\sum_{n=1}^{\infty} \left(\dfrac{3n+1}{3+5n}\right)^{n^2}$; **g)** $\sum_{n=1}^{\infty} \dfrac{1}{(n+2)\ln^2(n+1)}$.

2. Investigate for absolutely and conditionally convergence the alternating series $\sum_{n=1}^{\infty} (-1)^n \arctan \dfrac{2\pi}{3^n}$.

3. Find the interval for convergence of the power series

$$u_n = \frac{nx^{2n}}{2^n(n+1)}$$

Card |N 5

1. Investigate for convergence the following series:

a) $a_n = \dfrac{5n^3}{4^n}$; **b)** $\sum_{n=1}^{\infty} \dfrac{2+n}{3n^2-1}$; **c)** $\sum_{n=1}^{\infty} \dfrac{3^n}{7^n(3+n)!}$; **d)** $\sum_{n=1}^{\infty} \dfrac{3+n^2}{7n^2+5}$;

e) $\sum_{n=1}^{\infty} \dfrac{(2n+1)!}{3^{2n}}$; **f)** $\sum_{n=2}^{\infty} \dfrac{1}{(\ln n)^n}$; **g)** $\sum_{n=5}^{\infty} \dfrac{1}{(2+n)\sqrt[3]{\ln(n-3)}}$.

2. Investigate for absolutely and conditionally convergence the alternating series $\sum_{n=1}^{\infty} (-1)^n \dfrac{\tan\left(n\sqrt[3]{n}\right)^{-1}}{n+2}$.

3. Find the interval for convergence of the power series

$$u_n = \frac{(x-3)^{2n}}{(n+1)\ln(n+1)}$$

CARD N6

1. Investigate for convergence the following series:

a) $a_n = \dfrac{2^{n-1}}{n^n}$; **b)** $\sum\limits_{n=1}^{\infty} \dfrac{\sin\dfrac{2}{3n}}{\sqrt[3]{n^4}}$;

c) $\sum\limits_{n=1}^{\infty} \dfrac{5n}{2^n}$; **d)** $\sum\limits_{n=1}^{\infty} \dfrac{1}{n+1} \arcsin \dfrac{1}{\sqrt[3]{n+1}}$;

e) $\sum\limits_{n=1}^{\infty} \dfrac{(n+1)!}{(2n+1)!}$; **f)** $\sum\limits_{n=1}^{\infty} \left(\dfrac{3n+4}{5n-1}\right)^n$; **g)** $\sum\limits_{n=3}^{\infty} \dfrac{1}{n \ln(n-1)}$.

2. Investigate for absolutely and conditionally convergence the alternating series $\sum\limits_{n=1}^{\infty} \dfrac{(-1)^{n+2}}{(n+1)3^{2n}}$.

3. Find the interval for convergence of the power series

$$u_n = \frac{x^{n+1} 9^n}{n+1}$$

CARD N7

1. Investigate for convergence the following series:

a) $a_n = \dfrac{n+1}{n^2+n+1}$; **b)** $\sum\limits_{n=1}^{\infty} \dfrac{\arctan \dfrac{1}{n+1}}{n^2+1}$; **c)** $\sum\limits_{n=1}^{\infty} \dfrac{2^n}{(4^n+1)}$;

d) $\sum\limits_{n=1}^{\infty} \dfrac{2+n}{n!}$; **e)** $\sum\limits_{n=1}^{\infty} \dfrac{2^n}{(n+2)!}$; **f)** $\sum\limits_{n=1}^{\infty} n^2 \arctan^4 \dfrac{\pi}{3n}$;

g) $\cdot \sum\limits_{n=2}^{\infty} \dfrac{1}{(n+4)\ln^2(2n)}$.

2. Investigate for absolutely and conditionally convergence the alternating series $\sum\limits_{n=1}^{\infty} (-1)^n \dfrac{\sin\dfrac{\pi}{2\sqrt{n}}}{\sqrt{2n+1}}$.

3. Find the interval for convergence of the power series

$$u_n = \frac{nx^{5n}}{3n+2};$$

Card N8

1. Investigate for convergence the following series:

a) $\sum_{n=1}^{\infty} \frac{15}{4^n+3^n}$; **b)** $\sum_{n=1}^{\infty} \frac{n}{\sqrt{n^8+3n^2}}$; **c)** $\sum_{n=1}^{\infty} \frac{n^2+7}{3^n}$;

d) $\sum_{n=1}^{\infty} \frac{n+1}{\left(n^3+1\right)^{3/2}}$; **e)** $\sum_{n=1}^{\infty} \frac{1}{2^n}\left(1+\frac{1}{n}\right)^{n^2}$; **f)** $\sum_{n=1}^{\infty} \frac{1}{(4+n)\ln(n+3)}$;

g) $\sum_{n=1}^{\infty} \frac{(7n+1)}{(3n+1)!}$.

2. Investigate for absolutely and conditionally convergence the alternating series $\sum_{n=1}^{\infty} \frac{(-1)^n}{n\sqrt[3]{27n^2+1}}$.

3. Find the interval for convergence of the power series

$$u_n = \frac{(x-1)^n n^2}{(n+1)2^n};$$

Card N9

1. Investigate for convergence the following series:

a) $\sum_{n=1}^{\infty} \frac{n^4+2}{3^n}$; **b)** $\sum_{n=1}^{\infty} \frac{n^3}{\sqrt[3]{3(n+1)!}}$, **c)** $\sum_{n=1}^{\infty} \left(\frac{4n^2+3}{n+2}\right)^{2n}$,

d) $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n^3}+1} \arcsin \frac{n+2}{2n^2+3}$, **e)** $\sum_{n=1}^{\infty} \left(\frac{2n+5}{5n+2}\right)^n$

, **f)** $\sum_{n=1}^{\infty} \frac{1}{(n+1)\ln(n+2)}$, **g)** $\sum_{n=1}^{\infty} \frac{(n+2)}{(n+1)!}$.

2. Investigate for absolutely and conditionally convergence the alternating series $\sum_{n=1}^{\infty}(-1)^n \frac{n+4}{\sqrt{n^3}}$.

3. Find the interval for convergence of the power series

$$.u_n = \frac{(x+2)^n(2n-1)^n}{2^n n^n}$$

Card N10

1. Investigate for convergence the following series:

a) $a_n = \frac{7^n}{9^n + 5n}$; **b)** $\sum_{n=1}^{\infty} \frac{\arctan \frac{n^2}{2n^3}}{\sqrt[4]{n^5}+3}$;

c) $\sum_{n=1}^{\infty} \frac{(5n-2)}{3^n n!}$; **d)** $\sum_{n=1}^{\infty} \frac{1}{n^2} \tan \frac{1}{n^2+2}$;

e) $\sum_{n=1}^{\infty} \frac{(3n+7)\,2^n}{(n+3)!}$; **f)** $\sum_{n=1}^{\infty} \left(\frac{7n}{9n-1}\right)^{2n}$; **g)** $\sum_{n=2}^{\infty} \frac{1}{(2n+4)\ln(2n+1)}$.

2. Investigate for absolutely and conditionally convergence the alternating series $\sum_{n=1}^{\infty}(-1)^n \frac{\sin \frac{\pi}{2n}}{\sqrt{3n+1}}$.

3. Find the interval for convergence of the power series

$$u_n = \frac{x^{2n-1}2^{n-1}}{(4n-3)^2}$$

Card N11

1. Investigate for convergence the following series:

a) $a_n = \frac{3^n}{(7^n+2)^2}$; **b)** $\sum_{n=1}^{\infty} n \sin \frac{3}{n^4}$;

c) $\sum_{n=1}^{\infty}\frac{3^n}{(4n+3)!}$; **d)** $\sum_{n=1}^{\infty}\frac{2n}{4^n+3n+53}$;

e) $\sum_{n=1}^{\infty}\left(\frac{4n+1}{16n-2}\right)^n$; **f)** $\sum_{n=1}^{\infty}\left(\frac{2n+1}{3+9n}\right)^{n^2}$; **g)** $\sum_{n=1}^{\infty}\frac{1}{(n+3)\ln^3(n+2)}$.

2. Investigate for absolutely and conditionally convergence the alternating series $\sum_{n=1}^{\infty}(-1)^n\arctan\frac{2n}{3^n}$.

3. Find the interval for convergence of the power series

$$u_n=\frac{(x-2)^n}{(2n-1)2^n};$$

Card |N 12

1. Investigate for convergence the following series:

a) $a_n=\frac{5n^3}{4^n+7}$; **b)** $\sum_{n=1}^{\infty}\frac{2+n}{3n^2-1}$; **c)** $\sum_{n=1}^{\infty}\frac{3^n}{(4+n)!}$; **d)** $\sum_{n=1}^{\infty}\frac{3+2^2}{7n^2+5}$;

e) $\sum_{n=1}^{\infty}\frac{(2n+1)!}{3^{2n}}$; **f)** $\sum_{n=2}^{\infty}\frac{1}{(\ln n)^n}$; **g)** $\sum_{n=5}^{\infty}\frac{1}{(2+n)\sqrt[3]{\ln(n-3)}}$.

2. Investigate for absolutely and conditionally convergence the alternating series $\sum_{n=1}^{\infty}(-1)^n\frac{\tan\left(n\sqrt[3]{n}\right)^{-1}}{n^2+1}$.

3. Find the interval for convergence of the power series

$$u_n=\frac{x^{4n}}{(n+2)5^n};$$

CARD N13

1. Investigate for convergence the following series:

a) $a_n=\frac{2^{n-1}}{n^n}$; **b)** $\sum_{n=1}^{\infty}\frac{\sin\frac{4}{3n^2}}{\sqrt[3]{n^4}}$;

c) $\sum_{n=1}^{\infty} \frac{5n+7}{2^n}$; **d)** $\sum_{n=1}^{\infty} \frac{1}{n+1} \arcsin \frac{1}{\sqrt[3]{n+1}}$;

e) $\sum_{n=1}^{\infty} \frac{(n+1)}{(3n+1)!}$; **f)** $\sum_{n=1}^{\infty} \left(\frac{3n+4}{5n-1}\right)^n$; **g)** $\sum_{n=3}^{\infty} \frac{1}{n \ln(n-1)}$.

2. Investigate for absolutely and conditionally convergence the alternating series $\sum_{n=1}^{\infty} \frac{(-1)^{n+2}}{(n+1)9^n}$.

3. Find the interval for convergence of the power series

$$u_n = \frac{(x-3)^n (3n-2)}{(n+1)^2 2^{n+1}}$$

CARD N 14

1. Investigate for convergence the following series:

a) $a_n = \frac{n+4}{2n^2+3+1}$; **b)** $\sum_{n=1}^{\infty} \frac{\arctan \frac{1}{n+1}}{n^2+1}$; **c)** $\sum_{n=1}^{\infty} \frac{2^n}{(5^n+3)}$;

d) $\sum_{n=1}^{\infty} \frac{2+n}{n!}$; **e)** $\sum_{n=1}^{\infty} \frac{2^n}{(n+2)!}$; **f)** $\sum_{n=1}^{\infty} n^2 \arctan^4 \frac{\pi}{3n}$;

g) $.\sum_{n=2}^{\infty} \frac{1}{(2n+4)\ln^2(2n)}$.

2. Investigate for absolutely and conditionally convergence the alternating series $\sum_{n=1}^{\infty} (-1)^n \frac{\sin \frac{\pi}{2n}}{\sqrt[3]{3n+5}}$.

3. Find the interval for convergence of the power series

$$u_n = \frac{(-1)^n (x-3)^n}{(2n+1)\sqrt{n+1}}$$

Card N15

1. Investigate for convergence the following series:

a) $a_n = \frac{2n^3}{9^n + 7}$; **b)** $\sum_{n=1}^{\infty} \frac{2+3n}{4n^2 - 1}$; **c)** $\sum_{n=1}^{\infty} \frac{7^n}{(5+n)!}$; **d)** $\sum_{n=1}^{\infty} \frac{2+n^2}{3n^2+2}$;

e) $\sum_{n=1}^{\infty} \frac{(2n+1)!}{3^{2n}}$; **f)** $\sum_{n=2}^{\infty} \frac{n+5}{3^n}$; **g)** $\sum_{n=5}^{\infty} \frac{1}{(3+n)\sqrt[3]{\ln(n+3)}}$.

2. Investigate for absolutely and conditionally convergence the alternating series $\sum_{n=1}^{\infty} (-1)^n \frac{\tan \frac{1}{n^3}}{n^2+1}$.

3. Find the interval for convergence of the power series

$$u_n = \frac{x^{3n} n}{(n+1)7^n};$$

14.13.13. $u_n = \frac{(x+1)^n}{(n+1)\ln^2(n+1)}$; 14.13.14. $u_n = \frac{(n+1)x^n}{(n^2+1)2^n}$;

14.13.15. $u_n = \frac{(-1)^{n-1}(x-1)^{2n}}{2n3^n}$; 14.13.16. $u_n = \frac{(n+1)^{n/3} x^n}{n!}$;

14.13.17. $u_n = \frac{(x-1)^{2n}}{n9^n}$; 14.13.18. $u_n = \left(\frac{x \cdot n}{2n+1}\right)^{2n-1}$;

14.13.19. $u_n = \frac{nx^{2n}}{(5n+2^n)(n+1)}$; 14.13.20. $u_n = \frac{(n+1)^5 x^{2n}}{(2n+1)}$;

14.13.21. $u_n = \dfrac{7^n x^n}{5^n + 3^n}$;

14.13.22. $u_n = \dfrac{(-1)^{n-1}(x-5)^n}{n3^n}$;

14.13.23 $u_n = \dfrac{(n+1)x^n}{(n+2)+3^n}$;

14.13.24. $u_n = \dfrac{3^n x^n}{\sqrt{(2n-1)2^n}}$;

14.13.25. $u_n = \dfrac{5^n x^n}{n2^n}$;

14.13.26. $u_n = \dfrac{x^{2n}}{(n+1)n}$;

14.13.27. $u_n = \dfrac{5^n x^{4n}\sqrt{n}}{4^n}$;

14.