January 27 , 2000 FINAL EXAMINATION VERSION II

MATHEMATICS 201

FALL 1999- 2000

NAME ---------- ID# ----------

Time : 2 Hours

Circle out your instructor's name and your section number

Prof. H.Abu-Khuzam..... Section: 6 and 12

Prof. A. Lyzzaik.....Section: 5 and 7

NOTE: Make sure that you have 6 pages and twenty questions

GRADE: /100

Circle the correct answer in each of the following problems (5 points for each correct answer, and 0 for no or more than one answer)

1. The interval of convergence of the following series $\sum_{n=1}^{\infty} \frac{2^n (x-3)^n}{n^2}$ is

(A) $\frac{5}{2} < x < \frac{7}{2}$ (B) $\frac{5}{2} \le x \le \frac{7}{2}$ (C) $1 \le x \le 5$

(D) $1 < x < 5$ (E) none of the above

2. The surface $\frac{x^2}{36} - \frac{y^2}{36} = \frac{z}{6}$ is a

(A) elliptic paraboloid (B) elliptic cone (C) circular paraboloid

(D) hyperbolic paraboloid (E) none of the above

3. The sum of the series $\sum_{n=1}^{\infty} n(1/2)^{n-1}$ is

(A) 6 (B) e^2 (C) 4 (D) 25/4 (E) none of the above

4. Which one of the following series converges:

(A) $\sum_{n=1}^{\infty} \left[\sqrt{n+1} - \sqrt{n}\right]$ (B) $\sum_{n=1}^{\infty} \frac{2^n (n!)^3}{(3n)!}$ (C) $\sum_{n=1}^{\infty} \sqrt[n]{n}$

(D) $\sum_{n=1}^{\infty} \cos n\pi$ (E) $\sum_{n=1}^{\infty} \frac{1}{n}$

5. An estimate of the magnitude of the error obtained by taking the first four terms of the series $\sum_{n=1}^{\infty}(-1)^{n+1}\frac{(0.01)^n}{n^3}$ to approximate its value is

(A) 1.56×10^{-12} (B) 8×10^{-11} (C) 8×10^{-13}

(D) 1.56×10^{-10} (E) none of the above

6. The sequence whose n-th term is $a_n=(1-\frac{\pi}{n})^{2n}$

(A) Converges to $e^{-\pi}$ (B) Diverges (C) Converges to $e^{2\pi}$

(D) Converges to $e^{-2\pi}$ (E) none of the above

7. The series $\sum_{n=1}^{\infty}\frac{\cos n\pi}{n\sqrt{\ln n}}$

(A) is not alternating (B) diverges (C) converges conditionally

(D) converges absolutely (E) none of the above

8. The spherical coordinate equation for the sphere $x^2 + y^2 + (z - 4)^2 = 16$ is

(A) $\rho = 4\cos\theta$ (B) $\rho = 4\cos\phi$ (C) $\rho = 8\cos\phi$

(D) $\rho = 8\cos\theta$ (E) none of the above

9. The value of the double integral Evaluate $\int_0^2 \int_{x/2}^1 e^{-y^2}\,dydx$ is

(A) 1 - 1/e (B) 1 + 1/e (C) 1 (D) e (E) none of the above

10. If f(x,y) = ln xy +ln yz +ln xz, then the derivative of f at P(1,1,1) in the direction where f increases most rapidly is

(A) $\sqrt{3}$ (B) $2\sqrt{3}$ (C) 0

(D) $3\sqrt{3}$ (E) none of the above

11. Using the Maclaurin series for $\frac{-1}{1+x^5}$, the Maclaurin series of $\frac{5x^4}{(1+x^5)^2}$ is

(A) $\sum_{n=1}^{\infty} 5nx^{5n-1}$ (B) $\sum_{n=1}^{\infty} (-1)^n 5nx^{5n-1}$ (C) $\sum_{n=1}^{\infty} (-1)^{n+1} 5nx^{5n-1}$

(D) $\sum_{n=1}^{\infty} -5nx^{5n-1}$ (E) none of the above

12. Consider the function f(x,y) = $\begin{cases} \frac{x^4 y}{x^6 + y^3} & for\,(x,y) \neq (0,0) \\ k & for\,(x,y) = (0,0) \end{cases}$. Then

(A) f is discontinuous at (0,0) for all values of k.

(B) f is continuous at (0,0) provided that k=0

(C) f is continuous at (0,0), provided that k=1

(D) f is continuous at (0,0) , provided that k=−1.

(E) f is continuous at (0,0) for all values of k.

13. The function $f(x,y)=-x^3-y^3-5xy-1$ has

(A) saddle point at (0,0) and local maximum at $(-\frac{5}{3},-\frac{5}{3})$.

(B) saddle point at (0,0) and local minimum at $(-\frac{5}{3},-\frac{5}{3})$.

(C) saddle point at $(-\frac{5}{3},-\frac{5}{3})$ and local minimum at (0,0).

(D) saddle point at $(-\frac{5}{3},-\frac{5}{3})$ and local maximum at (0,0).

(E) local maximum at $(-\frac{5}{3},-\frac{5}{3})$.

14. The function $f(x,y)=3xy-6x-3y+7$ defined on the triangular plate R with vertices (0,0), (3,0), and (0,5) has

(A) an absolute maximum $\frac{9}{5}$ and absolute minimum –8.

(B) an absolute maximum $\frac{9}{5}$ and absolute minimum –11.

(C) an absolute maximum 7 and absolute minimum 1.

(D) an absolute maximum 8 and absolute minimum –11.

(E) none of the above.

15. The area of the region that is inside the cardioid $r = 4 + 4\cos\theta$ and outside the circle $r = 6$ is

(A) $18\sqrt{3} + 2\pi$ (B) $18\sqrt{3} - 4\pi$ (C) 5π

(D) $5\sqrt{3} + 10$ (E) none of the above

16. Using triple integration in cylindrical coordinates, the volume of the solid bounded above by the hemisphere $z=\sqrt{25-x^2-y^2}$, below by the xy-plane, and laterally by the cylinder $x^2+y^2=9$ is

(A) $40\pi/3$ (B) $35\pi/3$ (C) $122\pi/3$ (D) $46\pi/3$ (E) none of the above