1. Which of the following series converge?

I. $\sum_{n=1}^{\infty}\frac{2^n}{n+1}$ II. $\sum_{n=1}^{\infty}\frac{3}{n}$ III. $\sum_{n=1}^{\infty}\frac{\cos(2\pi n)}{n^2}$

(a) I only (b) II only (c) III only
(d) I and II only (e) I and III only

2. If $\sum_{n=0}^{\infty}a_n(x-c)^n$ is a Taylor series that converges to $f(x)$ for all real numbers x, then $f''(x)=$

(a) 0
(b) $(n)(n-1)a_n$
(c) $\sum_{n=0}^{\infty}n\cdot a_n(x-c)^{n-1}$
(d) $\sum_{n=0}^{\infty}a_n$
(e) $\sum_{n=0}^{\infty}n(n-1)a_n(x-c)^{n-2}$

3. What are all the values for which the series $\sum_{n=1}^{\infty}\frac{(x+2)^n}{n\sqrt{n}\cdot 3^n}$ converges?

(a) $-3<x<3$
(b) $-3\le x\le 3$
(c) $-5<x<1$
(d) $-5<x\le 1$
(e) $-5\le x\le 1$

4. Calculator required: The sum of the infinite geometric series $\frac{4}{5}+\frac{8}{35}+\frac{16}{245}+\frac{32}{1715}+\cdots$ is

(a) 0.622 (b) 0.893 (c) 1.120
(d) 1.429 (e) 2.800

5. For what integer $k>1$ will both $\sum_{n=1}^{\infty}\frac{(-1)^{kn}}{n^2}$ and $\sum_{n=1}^{\infty}\left(\frac{k}{3}\right)^n$ converge:

(a) 2 (b) 3 (c) 4 (d) 5 (e) 6

6. What are all the values of x for which the series $\sum_{n=1}^{\infty}\frac{(2x+3)^n}{\sqrt{n}}$ converges?

(a) $-2<x<-1$
(b) $-2\le x<-1$
(c) $-2<x\le -1$
(d) $-2\le x\le -1$
(e) $-2\le x<1$

7. The Taylor polynomial of degree 3 centered at $x=0$ for $f(x)=\sqrt{1+x}$ is

(a) $1+\frac{1}{2}x-\frac{1}{4}x^2+\frac{3}{8}x^3$
(b) $1+\frac{1}{2}x-\frac{1}{8}x^2+\frac{1}{16}x^3$
(c) $1-\frac{1}{2}x-\frac{1}{8}x^2-\frac{1}{16}x^3$
(d) $1+\frac{1}{2}x-\frac{1}{8}x^2+\frac{1}{8}x^3$
(e) $1-\frac{1}{2}x+\frac{1}{4}x^2-\frac{3}{8}x^3$

8. Which of the following series is divergent?

(a) $\sum_{n=1}^{\infty}\frac{1}{n^2}$ (b) $\sum_{n=1}^{\infty}\frac{1}{n^2+n}$ (c) $\sum_{n=1}^{\infty}\frac{n}{n^3+1}$

(d) $\sum_{n=1}^{\infty}\frac{n}{\sqrt{4n^2-1}}$ (e) None of these

9. Which one of the following series is convergent?

(a) $\sum_{n=1}^{\infty}\frac{1}{\sqrt[3]{n}}$ (b) $\sum_{n=1}^{\infty}\frac{1}{\sqrt{n}}$ (c) $\sum_{n=1}^{\infty}\frac{1}{n}$

(d) $\sum_{n=1}^{\infty}\frac{1}{10n-1}$ (e) $\sum_{n=1}^{\infty}\frac{2}{n^2-5}$

10. Which of the following statements are false?

(a) $\sum_{n=1}^{\infty}a_n=\sum_{n=k}^{\infty}a_n$ where k is any positive integer.

(b) If $\sum_{n=1}^{\infty}a_n$ converges, then so does $\sum_{n=1}^{\infty}c\cdot a_n$, where $c\neq 0$.

(c) $\sum_{n=1}^{\infty}a_n$ and $\sum_{n=1}^{\infty}b_n$ converge, so does $\sum_{n=1}^{\infty}(c\cdot a_n+b_n)$ where $c\neq 0$

(d) If 1000 terms are added to a convergent series, the new series also converges.

(e) Rearranging the terms of a positive convergent series will not affect its convergence or sum.

11. The series

$$(x-2)+\frac{(x-2)^2}{4}+\frac{(x-2)^3}{9}+\frac{(x-2)^4}{16}+\cdots$$

converges for

(a) $1\le x\le 3$ (b) $1\le x<3$ (c) $1<x\le 3$

(d) $0\le x\le 4$ (e) None of these

12. The radius of convergence of the series

$\frac{x}{4}+\frac{x^2}{4^2}+\frac{x^3}{4^3}+\cdots+\frac{x^n}{4^n}+\cdots$ is

(a) 0 (b) 1 (c) 2

(d) 4 (e) All real numbers

13. Which of the following series are conditionally convergent?

I. $\sum_{n=1}^{\infty}(-1)^{n+1}\frac{1}{2n+1}$

II. $\sum_{n=1}^{\infty}(-1)^{n}\frac{\cos(n)}{3^n}$

III. $\sum_{n=1}^{\infty}(-1)^{n+1}\frac{1}{\sqrt{n}}$

(a) I only (b) II only (c) I, II, and III

(d) I and III only (e) I and II only

14. $\sum_{n=0}^{\infty}\frac{(-1)^n x^n}{n!}$ is the Taylor Series about $x=0$ for which of the following functions?

(a) $\sin(x)$ (b) $\cos(x)$ (c) e^x

(d) e^{-x} (e) $\ln(1+x)$

15. $\sum_{n=1}^{\infty}\left(\frac{1}{3}\right)^{2n}=$

(a) $\frac{1}{8}$ (b) $\frac{1}{3}$ (c) 1 (d) $\frac{9}{8}$ (e) ∞

16. Calculator required: The graph of the function represented by the Maclaurin series

$x+x^2+\frac{x^3}{2!}+\frac{x^4}{3!}+\frac{x^5}{4!}+\cdots=\sum_{n=0}^{\infty}\frac{x^{n+1}}{n!}$

intersects the graph of $y=1+x^2$ at the point where $x=$

(a) 0.718 (b) 0.738 (c) 0.758

(d) 0.778 (e) 0.798