AP Calculus Homework 23

Please write your answer on a separate piece of paper and submit it on Classkick or write your answer directly on Classkick.

Please write all answers in exact forms. For example, write π instead of 3.14.

1. Determine whether the series is convergent or divergent. If it's convergent, find its sum.

a) $\displaystyle\sum_{n=1}^{\infty} \frac{n+1}{2n-3}$
b) $\displaystyle\sum_{n=1}^{\infty} \frac{1+2^n}{3^n}$
c) $\displaystyle\sum_{n=1}^{\infty} \sqrt[n]{2}$
d) $\displaystyle\sum_{n=1}^{\infty} \ln\left(\frac{n^2+1}{2n^2+1}\right)$

e) $\displaystyle\sum_{n=1}^{\infty} \left(\frac{1}{e^n} + \frac{1}{n(n+1)}\right)$
f) $\displaystyle\sum_{n=1}^{\infty} \left(\cos\frac{1}{n^2} - \cos\frac{1}{(n+1)^2}\right)$

2. Find the value of x for which the series converges. Find the sum of the series for those values of x.

$$\sum_{n=1}^{\infty} \frac{\cos^n x}{2^n}$$

3. Use the Integral Test to determine whether the series is convergent or divergent.

a) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{\sqrt[5]{n}}$
b) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{(2n+1)^3}$
c) $1 + \dfrac{1}{2\sqrt{2}} + \dfrac{1}{3\sqrt{3}} + \dfrac{1}{4\sqrt{4}} + \dfrac{1}{5\sqrt{5}} + \cdots$

d) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n^2+4}$
e) $\displaystyle\sum_{n=1}^{\infty} \frac{e^{1/n}}{n^2}$

4. Determine whether the series converges or diverges.

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

d) $\displaystyle\sum_{n=1}^{\infty} \frac{1+4^n}{1+3^n}$
e) $\displaystyle\sum_{n=1}^{\infty} \left(1+\frac{1}{n}\right)^2 e^{-n}$
f) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n!}$

5. Which of the following series diverge?

I. $\displaystyle\sum_{k=3}^{\infty} \frac{2}{k^2+1}$
II. $\displaystyle\sum_{k=1}^{\infty} \left(\frac{6}{7}\right)^k$
III. $\displaystyle\sum_{k=2}^{\infty} \frac{(-1)^k}{k}$

(A) None   (B) II only   (C) III only   (D) I and III   (E) II and III