Group Exam 8

Calculus II
Professor Johnson
Fall 2006

Name: _____
Name of group member: _____
Name of group member: _____

Problem 1: (a) Use algebra to show that the following equation holds for $r \neq 1$.

$$1 + r + r^2 + r^3 + \ldots + r^k = \frac{1 - r^{k+1}}{1 - r}$$

(b) Find an explicit formula for the k^{th} partial sum of the series below. (explicit means a formula without "...") Hint: use part (a).

$$1 - \frac{2}{5} + \frac{4}{25} - \frac{8}{125} + \frac{16}{625} + \ldots$$

Write the series above in summation notation, i.e. find the formula for a_n such that the series above can be written as $\sum_{n=0}^{\infty} a_n$. Determine whether the series above is convergent or divergent. If the series is convergent, find its sum.

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Problem 2: Find the 4th degree Taylor polynomial for $f(x) = \sqrt[3]{x}$ centered at $x = 8$.

Use this Taylor polynomial to approximate $\sqrt[3]{8.2}$ (you may use your calculator for this calculation). How many decimal places (to the right of the decimal point) are accurate in your approximation? What is the error?

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Problem 3: (a) Find a formula for the k^{th} partial sum of $\sum_{n=0}^{\infty} \frac{1}{(3n-2)(3n+1)}$. Hint: partial fractions.

(b) Determine whether or not the series $\sum_{n=0}^{\infty} \frac{1}{(3n-2)(3n+1)}$ is convergent or divergent. If the series is convergent, then find its sum.