Calculus III

Exam # 2

1) (24 points) Which of the following series converge and which diverge? Give reasons for your answers.

a) $\sum_{n=1}^{\infty} \frac{1}{2\sqrt{n}+\sqrt[3]{n}}$ b) $\sum_{n=1}^{\infty} \frac{e^n}{1+e^{2n}}$ c) $\sum_{n=1}^{\infty} (-1)^{n+1} \frac{3+n}{30+n}$

2) (18 points) Find the sum of each of the following series, if any.

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

3) (20 points) Consider the following series $\sum_{n=1}^{\infty} \frac{(-1)^n (x+2)^n}{n}$

a) Find the radius and interval of convergence

b) For what values of x does the series converge
i) Absolutely and ii) Conditionally?

4) (35 points) Let $f(x) = \ln(1+x)$

a) Write the Maclaurin series for $f(x)$

b) Use the Maclaurin series of $f(x)$ to find the Maclaurin series for $j(x) = \ln(1+x)^2$

c) Using the Maclaurin series of $f(x)$, how many terms you need to consider, in order to calculate $\ln(1.1)$ with an error of magnitude no greater than 10^{-8}?