

Math 231: Calculus 2
Exam 2
July 18, 2007

Name: _____

1) (20 points) Determine if the following series converge or diverge and justify your answer.

a) $\sum_{k=0}^{\infty} \frac{4}{(2+4k)^2}$

b) $\sum_{k=1}^{\infty} \frac{(-1)^{k+1} \ln(k)}{k}$

c) $\sum_{k=1}^{\infty} \frac{k+\ln(k)}{k^{4-\cos(k)}}$

d) $\sum_{k=0}^{\infty} \frac{(-1)^k \ln(k+4)}{\ln(5k-\pi)}$

2) (16 points) Determine the interval of convergence of the following series:

a) $\sum_{k=0}^{\infty} \frac{(-1)^k x^k}{\sqrt{k+1}}$

b) $\sum_{k=0}^{\infty} \frac{1}{k!} (x - 5)^k$

3) (12 points) Find a Taylor series representation for $\tan^{-1}(x^2)$.

4) (20 points) Approximate $\int_{-1}^1 \frac{e^{-x^2} - 1}{x^2} dx$ to within .001.

5) (20 points) Find the second degree Taylor polynomial $P_2(x)$ of $f(x) = \sin(x)\cos(x)$ at $a = \pi/4$ and the remainder term $R_2(x)$.

6) (12 points) Compute $\lim_{x \rightarrow 0} \frac{x/(1-x)}{e^x - 1}$.

7) (10 points) Choose one of the following series and evaluate it (that is, determine to what it converges).

a) $\sum_{k=1}^{\infty} \frac{3k+2}{k^3+3k^2+2k}$

b) $\sum_{k=0}^{\infty} \frac{k}{10^k}$