Review for Calculus II, Exam III

Caveat: The appearance of a problem on this review sheet doesn't guarantee that a similar problem will appear on the exam. Similarly, the non-appearance of a kind of a problem doesn't imply that it won't appear on the exam. Last, the number of problems on this review and their difficulty is not to be taken as an indicator of any aspect of the exam.

1. What do the following three sequences converge to? (Give reasons.)

$$\{17 + (-1)^n(1/n)\}, \qquad \{(1/n)\cdot\sin(1/n)\}, \qquad \{2 + \exp(k/(k^2+1))\}$$

2. Does the sequence .8, .88, .888, .8888, ... converge? Why or why not?

3. Does the sequence .188888..., .8188888..., .8818888..., .8881888..., .8888188..., .88888188..., ... converge? Why or why not?

4. **Use a geometric series** to put .987987987... into a fraction.

5. Write sin(2)/1 - sin(4)/2 + sin(6)/3 - sin(8)/4 + ... in sigma notation.

6. What, precisely, does $\sum_{k=1}^{\infty}\left(e^{-k} - e^{-(k+1)}\right)$ equal?

7. Which of the following series converge? (Explain, prove, etc.)

$$\sum_{n=1}^{\infty}\frac{1}{2n} \qquad \sum_{m=10}^{\infty}\frac{(-1)^m}{\ln(\ln(m+2))} \qquad \sum_{s=1}^{\infty}\frac{10s^3+100}{s^{3.9}}$$

8. What is the radius of convergence of $\sum_{m=0}^{\infty}\frac{(x-4)^m}{2^m}$? What is the interval of convergence?

9. What are the first four non-zero terms of the Maclaurin series of $x^7\cdot\cos(15x^4)$?

10. Write out the first four non-zero terms of the Maclaurin series for the integral:

$$\int \frac{1}{1+x^4}\,dx$$