REVIEW QUESIONS FOR EXAM 2

MATH 230, Section AL1, Spring 2005

(I) Determine whether or not the SEQUENCE $\{a_n\}$ converges, and find its limit if it does converge.

$$a_n = \frac{\ln(2\,n)}{\ln(3\,n)} \tag{1}$$

$$a_n = \frac{1+(-1)^n}{\sqrt{n}} \tag{2}$$

$$a_n = (2\,n+5)^{\frac{1}{n}} \tag{3}$$

(Hint: you might want to go over the review of limits.)

(II) Determine whether the POSITIVE TERM SERIES below converge or diverge.

$$\sum_{n=1}^{\infty} \frac{\sqrt{n}}{\ln(n+1)} \tag{4}$$

$$\sum_{n=1}^{\infty} \left(\frac{3}{n} - \frac{1}{3^n}\right) \tag{5}$$

$$\sum_{n=1}^{\infty} \frac{1}{23\,n+17} \tag{6}$$

$$\sum_{n=1}^{\infty} \frac{1}{n-\ln n} \tag{7}$$

$$\sum_{n=1}^{\infty} \frac{n^2}{4\,n^3+7} \tag{8}$$

(III) Determine whether the ALTERNATING SERIES below converge absolutely, converge conditionally or diverge.

$$\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{\sqrt{n^2+1}} \tag{9}$$

$$\sum_{n=1}^{\infty} \frac{(-1)^n\,2^n}{n!\,n} \tag{10}$$

$$\sum_{n=1}^{\infty} (-1)^n \left(\frac{\ln n}{n}\right)^n \tag{11}$$

(IV)

- Solve the initial value problem $\frac{dy}{dx} = 3\,y + 1$, $y(0) = 2$. (12)
- The half life of a radiactive material is 6 years. Suppose that a nuclear accident has left the level of radiation of this material in a certain region at 200 times the level acceptable for human habitation. How long will it be before the region is again habitable? (13)

(V)

- Find the area of the surface of revolution generated by revolving the curve $x = y^3, \quad 0 \le y \le 1$ around the y-axis. (14)
- Find the length of the smooth arc $y = \frac{x^2}{8} - \ln x$, from $x = 1$ to $x = 2$. (15)

Answers:

1. 1
2. 0
3. 1
4. diverges
5. diverges
6. diverges
7. diverges
8. diverges
9. converges conditionally
10. converges absolutely
11. converges absolutely
12. $y = \frac{7\,e^{3\,x} - 1}{3}$
13. $\frac{6\ \ln 200}{\ln 2}$
14. $\frac{10\,\sqrt{10}\,\pi}{27}$
15. $\frac{3}{8} + \ln 2$