

Mathematics 248 Spring 2007 – Review for Test 2

1. Find the integral.

$$\begin{array}{llll}
 \text{(a)} \int \frac{x-1}{x^2-5x+6} dx & \text{(b)} \int \ln x dx & \text{(c)} \int \tan^3 x \sec^4 x dx & \text{(d)} \int x^3 \sqrt{9-x^2} dx \\
 \text{(e)} \int \frac{1}{x^3+x} dx & \text{(f)} \int 3 \cos^2 7x dx & \text{(g)} \int x e^{2x} dx & \text{(h)} \int \frac{x}{x+1} dx
 \end{array}$$

2. Find the limit.

$$\text{(a)} \lim_{x \rightarrow 0} \frac{e^x - 1}{\sin x} \quad \text{(b)} \lim_{x \rightarrow \infty} \frac{e^x}{x^3} \quad \text{(c)} \lim_{x \rightarrow \infty} e^{-x} \ln x \quad \text{(d)} \lim_{x \rightarrow 0} \frac{e^{2x} - 1}{2x + 3} \quad \text{(e)} \lim_{x \rightarrow 0^+} x^x$$

3. Find the integral.

$$\text{(a)} \int_3^\infty \frac{1}{2x+1} dx \quad \text{(b)} \int_0^\infty \frac{1}{x^2+1} dx \quad \text{(c)} \int_0^1 \frac{1}{x^2} dx$$

4. Write an expression for the n th term of the sequence.

$$\text{(a)} 2, 4, 6, 8, 10, \dots \quad \text{(b)} \frac{\sin 1}{4}, \frac{\sin 2}{8}, \frac{\sin 3}{16}, \frac{\sin 4}{32}, \frac{\sin 5}{64}, \dots \quad \text{(c)} 1, -3, 5, -7, 9, -11, \dots$$

5. Find the limit, or explain why the limit does not exist.

$$\text{(a)} a_n = \frac{2n^2 + 1}{5n^3 - 2} \quad \text{(b)} a_n = n(n-1) \quad \text{(c)} a_n = \left(-\frac{3}{4}\right)^n \quad \text{(d)} 1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \dots$$

6. Find the exact value of the series.

$$\text{(a)} \sum_{n=0}^{\infty} \frac{3}{2^n} \quad \text{(b)} \sum_{n=2}^{\infty} \left(\frac{2}{3}\right)^n \quad \text{(c)} \sum_{n=0}^{\infty} \frac{2^{n+1}}{5^n} \quad \text{(d)} \sum_{n=1}^{\infty} \frac{4}{n(n+2)} \quad \text{(e)} \sum_{n=1}^{\infty} 3 \left(\frac{1}{2}\right)^{n-1}$$

7. Determine if the series converges or diverges.

$$\text{(a)} \sum_{n=1}^{\infty} \frac{1}{n^2} \quad \text{(b)} \sum_{n=1}^{\infty} \frac{1}{\sqrt{n}} \quad \text{(c)} \sum_{n=1}^{\infty} n^2 e^{-n^3} \quad \text{(d)} \sum_{n=1}^{\infty} \frac{n+1}{n} \quad \text{(e)} \sum_{n=0}^{\infty} 1.1^n$$

8. Let n be any positive integer. Explain why $\lim_{x \rightarrow \infty} \frac{x^n}{e^x} = 0$.

9. Find the exact value of the sum $1 + .5 + .25 + .125 + .0625 + .03125 + \dots$

10. What is the limit of the sequence $1, 2, 3, 3, 3, 3, \dots$

11. What is the limit of the sequence $\lim_{n \rightarrow \infty} \frac{n!}{2^n}$.

12. Find a formula for the n th term of the sequence $0, 2, 0, 2, 0, 2, \dots$

13. Find the exact value of the sum $\sum_{n=0}^{\infty} \frac{2^{2n}}{5^n}$.