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Math 222
Midterm Exam

Prof. Beck
November 10, 2005

Name: ______________________________

TA: ______________________________

| Problem | Score |
|---|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| 9 | |
| 10 | |
| Total | |

1. If the pattern shown in Figure 4 is continued indefinitely, what fraction of the original square will eventually be painted?

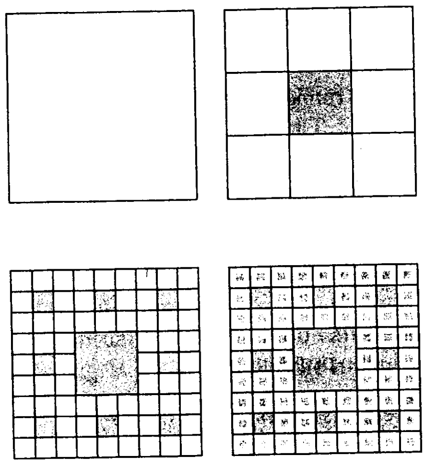

Figure 4

2. Use any test to determine convergence. State the test.

$$\sum_{k=1}^{\infty} k^2 e^{-k^3}$$

3. Determine convergence or divergence for this series. Indicate the test you use.

$$\sum_{n=1}^{\infty} \frac{n^2}{n!}$$

4. Classify each series as absolutely convergent, conditionally convergent, or divergent.

$$\sum_{n=1}^{\infty} (-1)^n \frac{\sin n}{n\sqrt{n}}$$

5. For which values of $x$ does this series converge? For which does it converge absolutely?

$$\frac{x-1}{1} + \frac{(x-1)^2}{2} + \frac{(x-1)^3}{3} + \frac{(x-1)^4}{4} + \cdots$$

6. State and prove the integral test for convergence of series.

7. Find the first five terms of the Maclaurin series.

$$f(x) = e^x + x + \sin x$$

8. Find the first five terms of the Maclaurin series.

$$f(x) = \frac{1}{1 + x + x^2}$$

9. Expand $e^x$ in a Taylor series about 2.

10. Sum:

$$\sum_{n=1}^{\infty} \frac{1}{4n(4n-1)}$$