**Math 112 Basic Skills Exam Sample Exam 4**

All numbered problems are worth ten points except problem 9, which is worth 20 points.

1. $\int \frac{(\ln x)^5}{x}\,dx =$

2. $\int \frac{1}{\sqrt{4+x^2}}\,dx =$ Use $x = 2\tan\theta$ and $\int \sec\theta\,d\theta = \ln|\tan\theta + \sec\theta| + C$.

3. $\int x\cos(2x)\,dx =$

4. a) $\lim_{x\to 0} \frac{\cos(2x)}{x^2} =$ b) $\lim_{x\to 0} \frac{e^x - 1}{x} =$

5. Find the sum of the series $\frac{4}{9} - \frac{4}{27} + \frac{4}{81} - \frac{4}{243} + \ldots$.

6. $\int_0^\infty \frac{1}{(2x+1)^3}\,dx =$

7. Find the interval of convergence of $\sum_{k=0}^{\infty} k2^k(x-7)^k$ except for the endpoints.

8. Find the power series expansion about $x = 0$ of the function $f(x) = \frac{3x}{1+x^2}$.

9. For each of the following series state whether it
   A) converges absolutely, B) converges conditionally, or C) diverges.
   You do not need to justify your answers. (Print the letters of your choices.)

   (a) $\sum_{k=2}^{\infty} \frac{k+1}{k^2-1}$ b) $\sum_{k=1}^{\infty} \frac{k^2}{2^k}$ c) $\sum_{k=1}^{\infty} \frac{(-1)^k k+1}{2k^3+1}$ d) $\sum_{k=2}^{\infty} (-1)^k \frac{k^2-k+3}{5-k^2}$