Math 227  Sample Final Exam

1. Evaluate \( \int arccos \, x \, dx \)
   Hint: write \( arccos \, x = 1 - arccos \, x \) and integrate by parts.

2. Evaluate \( \int \frac{x}{(x+1)^2} \, dx \)
   Hint: use partial fractions \( \frac{a}{x+1} + \frac{b}{(x+1)^2} \).

3. Find the volume of the solid obtained by revolving the region bounded by
   \( y = e^x, \ y = 0, \ x = 0, \ x = 1 \), about the \( y \)-axis.

4. Evaluate \( \int_0^1 x(\ln \, x)^2 \, dx \)

5. Evaluate \( \int \frac{1}{x + \sqrt{x}} \, dx \)

6. Determine whether the sequence is convergent or divergent:
   \( a_n = n^{-n} \)

7. Find the radius of convergence of:
   \( \sum_{n=0}^{\infty} n^2 e^{-n} x^n \)

8. Determine whether the series is convergent or divergent:
   \( \sum_{n=2}^{\infty} \frac{1}{n(\ln \, n)^2} \)

9. Determine whether the series is convergent or divergent:
   \( \sum_{n=0}^{\infty} \frac{1}{\sqrt{n^2+1}} \)

10. Find the Taylor series with center \( c = 0 \) of \( f(x) = \sin(x^2) \)