

Fall 04 Midterm

1. $\int_0^1 \frac{\sin(\tan^{-1} x) \tan^{-1} x}{x^2 + 1} dx =$
2. $\int \frac{x^2 - x + 2}{x^3 + x} dx =$
3. $\int e^{\frac{\sqrt{1-x^2}}{x}} \cdot \frac{dx}{x^2 \sqrt{1-x^2}} =$
4. Does $\int_0^\pi \frac{\sin \sqrt{x}}{x(1+x)} dx$ converge or diverge? Give your reasons.
5. Does $\int_0^\infty \frac{\ln(5 + \cos x)}{x^2} dx$ converge or diverge? Give your reasons.
6. Does $\sum_{n=3}^\infty \frac{7^n \ln n}{n!}$ converge or diverge? Give your reasons.
7. Does $\sum_{n=1}^\infty \sin\left(\frac{1}{n^2}\right) \ln n$ converge or diverge? Give your reasons.
8. Evaluate $\sum_{n=2}^\infty \frac{2^n + 3^{n+1}}{5^n} =$.
9. For what values of x does $\sum_{n=1}^\infty \left(1 + \frac{x}{n}\right)^{n^2}$ converge?