

P. Vojta

Math 1BM First Midterm

Thu 17 Feb 2000

1. (5 points) Estimate the integral $\int_0^\pi \sin x$ using Simpson's rule with $n = 6$.
2. (6 points) Find $\int_0^4 \frac{\ln x}{\sqrt{x}} dx$
3. (6 points) Find $\int_0^\infty \frac{\arctan x dx}{(1+x^2)\sqrt{(\pi/2)^2 - (\arctan x)^2}}$. Be careful to explain your steps.
4. (6 points) Determine whether the series $\sum_{n=1}^\infty \frac{3^n + 5^n}{15^n}$ converges or diverges. If it converges, find the sum.
5. (7 points) Find the area of the surface obtained by rotating the curve $y = e^x$, $0 \leq x \leq \ln 2$, about the x -axis.
6. (8 points) Find $\int \frac{5x^2 - 5x + 5}{x^3 - 2x^2 + x - 2} dx$.
7. (12 points) Find two of the following six integrals: [**Caution:** some of these integrals are *impossible!*]

(a). $\int \frac{dx}{\ln x}$	(d). $\int \frac{\sin^2 x}{\cos^4 x} dx$
(b). $\int \sin \sqrt{x} dx$	(e). $\int e^x \ln x dx$
(c). $\int \sqrt[3]{x^2 + 1} dx$	(f). $\int x \sqrt{x^2 + 4x + 13} dx$

- Be sure to circle the ones you want credit for.
- "Divergent" is an acceptable answer (say why).
- "Impossible" is not an acceptable answer.
- Don't forget the formulas on page 2.
- Continue onto the other side of this sheet as necessary.