

Math 107 Practice Exam 1

Part I

1. (10pts) Evaluate $\int x^3 \ln x \, dx$
2. (10pts) Evaluate $\int \frac{1}{x^2-4x+3} \, dx$
3. (10pts) Two mg of radioactive material decays to 1.3 mg after 10 days. Find the half-life of the material.
4. (15pts) Find $f(x)$ if $f'(x) = -2f(x) + 4$, $f(0) = -3$
5. (15pts) Find the fourth order Taylor polynomial of $\sin x$ centered at $x = \frac{\pi}{2}$

Part II

6. a. (10 pts) Write down the Taylor polynomial approximation of order n to e^x on the interval $[0,1]$ and give an estimate for $R_n(x)$.
b.(10pts) Choose n to approximate e^{-1} with an error less than .001. To receive full credit you must justify the accuracy of your approximation.
7. a (10pts) Solve the IVP:

$$y(t) = (0.1)y(1 - y) \quad , \quad y(0) = .2$$

- b. (10 pts) How long does it take until $y(t)$ reaches the value . 5 ?