

Exam #2
MA 172-02

Name: _____

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For Problems #1-2, identify the type of conic section. Then sketch its graph.

1. $y^2 - 2x - 4x + 3 = 0$.

2. $x^2 - y^2 - 4x + 3 = 0$.

3. For the parametric equations $x = 2 \cos(\theta/2) + 1, y = -4 \sin(\theta/2)$,

- (a) Obtain a rectangular representation of this curve.
- (b) Identify this curve by name and plot it.

4. Eliminate the parameter in the equations $x = \ln t, y = 1 + t^2$. Plot this curve for $1/e \leq t \leq e$.

For Problems #5-7, tell why each integral is improper. Then compute to what the integrals converge, or show that they diverge.

5. $\int_0^6 \frac{1}{x-6} dx$

6. $\int_0^{\pi/4} \frac{\cos x}{\sqrt{\sin x}} dx$

7. $\int_1^{\infty} \frac{\ln x}{x} dx$

Perform the integrations in Problems #8-12.

8. $\int \frac{1}{x\sqrt{x^2+3}} dx$

9. $\int \frac{\sqrt{x^2-4}}{x^2} dx$

10. $\int \frac{1}{(x+2)(x^2+1)} dx$

11. $\int \frac{2x + 3}{(x + 1)^2} dx$

12. $\int \sqrt{x} \ln x dx$

Bonus: Recall that the error in using Simpson's rule to approximate $\int_a^b f(x) dx$ with a step-size of Δx is

$$E_S(n) \leq \frac{b-a}{180} (\Delta x)^4 K,$$

where K is a bound on $|f''''(x)|$ on $a \leq x \leq b$.

Find the maximum error in using Simpson's rule with $n = 100$ subdivisions to approximate $\int_0^{100} \cos x dx$.