

Review 2 Spring 1989

1. Find  $\int x \sin^{-1} 3x \, dx$

2. Find  $\int \frac{x^3 + 2}{x^2 - 1} \, dx$

3. Find  $\int \sqrt{4 - x^2} \, dx$

4. Find  $\int \frac{1}{x^2 + 4x + 7} \, dx$

5. Find  $\int e^{-x} \cos 2x \, dx$

6. Find  $\int \frac{1}{\sqrt{4x^2 - 1}} \, dx$

7. Find  $\int \frac{3x^2 - 2x + 8}{x(x^2 + 4)} \, dx$

8. Find  $\int_0^{\frac{\pi}{6}} \sin^5 \cos^{\frac{1}{2}} x \, dx$

9. Use Simpson's rule, with  $n = 4$ , to write a sum which approximates the integral

$$\int_2^6 \sqrt{x^2 - 1} \, dx$$

10. Graph  $r = 1 - 2 \sin \theta$ . Label all intercepts.

11. Match each of the polar equations below with one of the polar curves on the right.  
 (Answers only will be graded).
- a)  $r = \cos 3\theta$ .
  - b)  $r = 2 \cos \theta$ .
  - c)  $r \cos \theta = 2$ .

12. Let  $C$  be the curve given by the parametric equations

$$\begin{aligned} x &= t - \sin t & 0 \leq t \leq 2\pi. \\ y &= 1 - \cos t \end{aligned}$$

- a) Set up, but **do not evaluate**, the integral for the arc length of  $C$ .
- b) Find  $\frac{dy}{dx}$  when  $t = \frac{\pi}{2}$ .

### Supplementary Review Problems on Complex Numbers

1. Evaluate (i.e., write in the form  $x + iy$ ,  $x$  &  $y$  real):

a)  $z = \frac{1+i}{1-i}$       b)  $x = e^{(1-i)}$       c) all  $z$  such that  $z^3 = 2i - 2$

2. Find each limit, if it exists:

a)  $\lim_{z \rightarrow i} \frac{z^2 + 2}{z^2 + 3}$       b)  $\lim_{z \rightarrow i} \frac{z^2 + 1}{z - i}$       c)  $\lim_{z \rightarrow 1+i} \frac{z^2 - 2iz - 2}{z - 1 - i}$

3. Find the radius of convergence:

a)  $\sum_{k=1}^{\infty} \frac{z^k}{k^2 3^k}$

b)  $\sum_{k=0}^{\infty} \frac{z^k}{k^3}$

c)  $\sum_{k=0}^{\infty} \frac{z^k}{k^k}$

4. Show that the series  $\sum_{k=0}^{\infty} z^k$  diverges at  $z = i$ .