

## Math 222 Exam 1 Review Answers

### Problem 1

(a)  $x^4 \sin x + 4x^3 \cos x - 12x^2 \sin x - 24x \cos x + 24 \sin x + C$

(b)  $\frac{1}{2} \tan^2 \theta + \ln |\cos \theta| + C$

(c)  $\sec^{-1} |t + 1| + C$

(d)  $6 \ln \left| \frac{1+y^{1/6}}{y^{1/6}} \right| + C$

(e)  $\frac{3}{8}x + \frac{1}{4} \sin(2x) + \frac{1}{32} \sin(4x) + C$

(f)  $x \tan x + \ln |\cos x| + C$

### Problem 2

(a) 1

(b)  $\sqrt{3}$

(c) 1/2

### Problem 3

(a) Diverges

(b) Diverges

(c) Converges

### Problem 4

$$x(t) = 3 \ln(t + 1) - \frac{1}{t+1} + 3$$

### Problem 5

(a)  $x = x^2 + y^2 + \frac{y}{x}$

(b)  $2xy + \frac{1}{x} = 1$

Equation  $r = \frac{16/9}{1+(1/3)\cos\theta}$  or  $r = \frac{16}{9+3\cos\theta}$

Directrix  $x = 16/3$

### Problem 7

$$\sqrt{2}$$

### Problem 8

$$\frac{5}{2}x'^2 + \frac{1}{2}y'^2 = 1$$

### Problem 9

$$\frac{\sqrt{2}}{2} + \frac{1}{2} \ln(\sqrt{2} + 1)$$

### Problem 10

(a)  $(0, 0), (3/2, \pi/6), (3/2, 5\pi/6)$

(b)  $2\pi$