## Section 10.5 - Polar Graphs (Anton new)

17-20 Find an equation for the given polar graph.
17. (a)


Circle

Limaçon
(b)


Circle
(b)


Circle
(b)

Limaçon


(c)


Cardioid
18. (a)
19. (a)


Four-petal rose
20. (a)


Cardioid
(b)


Five-petal rose
(c)


Three-petal rose
(c)


Lemniscate


Circle

21-50 Sketch the curve in polar coordinates.

| 21. $\theta=\frac{\pi}{3}$ | 22. $\theta=-\frac{3 \pi}{4}$ | 23. $r=3$ |
| :--- | :--- | :--- |

$\begin{array}{ll}\text { 24. } r=4 \cos \theta & \text { 25. } r=6 \sin \theta \\ \text { 26. } r=1+\sin \theta\end{array}$
27. $2 r=\cos \theta$
29. $r=3(1+\sin \theta)$
31. $r=4-4 \cos \theta$
33. $r=-1-\cos \theta$
35. $r=2+\cos \theta$
37. $r=3+4 \cos \theta$
39. $r=5-2 \cos \theta$
41. $r^{2}=\cos 2 \theta$
43. $r^{2}=16 \sin 2 \theta$
45. $r=4 \theta \quad(\theta \leq 0)$
47. $r=-2 \cos 2 \theta$
49. $r=9 \sin 4 \theta$
28. $r-2=2 \cos \theta$
30. $r=5-5 \sin \theta$
32. $r=1+2 \sin \theta$
34. $r=4+3 \cos \theta$
36. $r=3-\sin \theta$
38. $r-5=3 \sin \theta$
40. $r=-3-4 \sin \theta$
42. $r^{2}=9 \sin 2 \theta$
44. $r=4 \theta \quad(\theta \geq 0)$
46. $r=4 \theta$
48. $r=3 \sin 2 \theta$
50. $r=2 \cos 3 \theta$

