

Math 103: College Algebra and Trigonometry
Answers for recommended Chapter 11 homework

Many properties of the curves are given below; you were asked to give at least two (in addition to identifying which curve is represented). The properties listed below in [brackets] were not discussed in class, but are described in the textbook if you're interested.

1. Line; slope $\frac{3}{2}$, y -intercept $\frac{5}{2}$, x -intercept $-\frac{5}{3}$
2. Hyperbola; opens left and right, center $(3, -2)$, asymptotes $y+2 = 2(x-3)$ and $y+2 = -2(x-3)$, x -intercepts $3 - \sqrt{5}$ and $3 + \sqrt{5}$, y -intercepts $-2 + 2\sqrt{5}$ and $-2 - 2\sqrt{5}$; [transverse axis $y = -2$ (parallel to x -axis), conjugate axis $x = 3$ (parallel to y -axis), vertices $(1, -2)$ and $(5, -2)$, foci $(-2\sqrt{5}, -2)$ and $(2\sqrt{5}, -2)$]
3. Ellipse; center $(3, -1)$, major axis is vertical and has length 6, minor axis is horizontal and has length 4, x -intercepts $\frac{9+4\sqrt{2}}{3}$ and $\frac{9-4\sqrt{2}}{3}$, no y -intercepts; [vertices $(3, -4)$ and $(3, 2)$, foci $(3, -1 - \sqrt{5})$ and $(3, -1 + \sqrt{5})$]
4. Point; $(0, 0)$. [There really aren't too many properties of a point; this is about all you can say.]
5. Ellipse; center $(-2, 1)$, major axis is horizontal and has length 4, minor axis is vertical and has length 2, x -intercept -2 , y -intercept 1; [vertices $(-4, 1)$ and $(0, 1)$, foci $(-2 - \sqrt{3}, 1)$ and $(-2 + \sqrt{3}, 1)$]
6. Line; slope $\frac{2}{3}$, y -intercept 0, x -intercept 0
7. Hyperbola; opens left and right, center $(0, 0)$, asymptotes $y = 2x$ and $y = -2x$, x -intercepts -2 and 2 , no y -intercepts; [transverse axis $y = 0$ (the x -axis), conjugate axis $x = 0$ (the y -axis), vertices $(-2, 0)$ and $(2, 0)$, foci $(-2\sqrt{5}, 0)$ and $(2\sqrt{5}, 0)$]
8. Ellipse; center $(-5, 4)$, major axis is horizontal and has length 8, minor axis is vertical and has length 4, no x -intercepts, no y -intercepts; [vertices $(-9, 4)$ and $(-1, 4)$, foci $(-5 - 2\sqrt{3}, 4)$ and $(-5 + 2\sqrt{3}, 4)$]
9. Hyperbola; opens left and right, center $(0, 0)$, asymptotes $y = \frac{3}{5}x$ and $y = -\frac{3}{5}x$, x -intercepts -5 and 5 , no y -intercepts; [transverse axis $y = 0$ (the x -axis), conjugate axis $x = 0$ (the y -axis), vertices $(-5, 0)$ and $(5, 0)$, foci $(-\sqrt{34}, 0)$ and $(\sqrt{34}, 0)$]
10. Line; slope $\frac{3}{4}$, y -intercept $-\frac{5}{4}$, x -intercept $\frac{5}{3}$
11. Parabola; opens up, vertex $(2, -8)$, x -intercepts $2 + 2\sqrt{2}$ and $2 - 2\sqrt{2}$, y -intercept -4 , axis $x = 2$ (parallel to the y -axis); [focus $(2, -\frac{31}{4})$, directrix $y = -\frac{33}{4}$, latus rectum joins $(\frac{3}{2}, -\frac{31}{4})$ and $(\frac{5}{2}, -\frac{31}{4})$ and has length 1]
12. Line; slope $-\frac{1}{3}$, y -intercept 2, x -intercept 6
13. Hyperbola; opens left and right, center $(-4, 3)$, asymptotes $y = \frac{1}{3}x$ and $y = -\frac{1}{3}x$, x -intercepts $-4 - 3\sqrt{10}$ and $-4 + 3\sqrt{10}$, y -intercepts $\frac{9+\sqrt{7}}{3}$ and $\frac{9-\sqrt{7}}{3}$; [transverse axis $y = 3$ (parallel to the x -axis), conjugate axis $x = -4$ (parallel to the y -axis), vertices $(-7, 3)$ and $(-1, 3)$, foci $(-4 - \sqrt{10}, 3)$ and $(-4 + \sqrt{10}, 3)$]
14. Parabola; opens to the left, vertex $(0, 2)$, x -intercept -1 , y -intercept 2, axis $y = 2$ (parallel to the x -axis); [focus $(-1, 2)$, directrix $x = 1$, latus rectum joins $(-1, 0)$ and $(-1, 4)$ and has length 4]
15. Ellipse; center $(1, 0)$, major axis is vertical and has length 6, minor axis is horizontal and has length 2, x -intercepts 0 and 2, y -intercept 0; [vertices $(1, -3)$ and $(1, 3)$, foci $(1, -2\sqrt{2})$ and $(1, 2\sqrt{2})$]
16. Parabola; opens up, vertex $(-4, -2)$, x -intercepts $-4 - 4\sqrt{2}$ and $-4 + 4\sqrt{2}$, y -intercept -1 , axis $x = -4$ (parallel to the y -axis); [focus $(-4, 2)$, directrix $y = -6$, latus rectum joins $(-12, 2)$ and $(4, 2)$ and has length 16]

17. $3r \cos \theta = r^2$

Circle; center $(\frac{3}{2}, 0)$, radius $\frac{3}{2}$

18. $r \sin \theta = 5r \cos \theta - 3$ $\left(\text{or } r = \frac{3}{5 \cos \theta - \sin \theta} \right)$

Line; slope 5, y -intercept -3 , x -intercept $\frac{3}{5}$

19. $9r^2 \cos^2 \theta + r^2 \sin^2 \theta - 18r \cos \theta = 0$ (or $r^2 + 8r^2 \cos^2 \theta - 18r \cos \theta = 0$)

Ellipse; center $(1, 0)$, major axis is vertical and has length 6, minor axis is horizontal and has length 2, x -intercepts 0 and 2, y -intercept 0; [vertices $(1, -3)$ and $(1, 3)$, foci $(1, -2\sqrt{2})$ and $(1, 2\sqrt{2})$]

20. $r^2 \cos^2 \theta + 8r \cos \theta = 4r \sin \theta - 8$

Parabola; opens up, vertex $(-4, -2)$, x -intercepts $-4 - 2\sqrt{2}$ and $-4 + 2\sqrt{2}$, y -intercept 2, axis $x = -4$ (parallel to the y -axis); [focus $(-4, -1)$, directrix $y = -3$, latus rectum joins $(-6, -1)$ and $(-2, -1)$ and has length 4]

21. $r^2 = 16$

Circle; center $(0, 0)$, radius 4

22. $r^2 \cos(2\theta) - 2r \cos \theta - 2r \sin \theta - 1 = 0$

Hyperbola; opens left and right, center $(1, -1)$, asymptotes $y + 1 = x - 1$ and $y + 1 = -x + 1$, x -intercepts $1 - \sqrt{2}$ and $1 + \sqrt{2}$, y -intercept -1 ; [transverse axis $y = -1$ (parallel to the x -axis), conjugate axis $x = 1$ (parallel to the y -axis), vertices $(0, -1)$ and $(2, -1)$, foci $(1 - \sqrt{2}, -1)$ and $(1 + \sqrt{2}, -1)$]