

Test Bank Exercises in

CHAPTER 5

Exercise Set 5.1

1. Find the intercepts, the vertical asymptote, and the horizontal asymptote of the graph of $f(x) = \frac{2x + 1}{x - 1}$.
2. Find the intercepts, the vertical asymptote, and the horizontal asymptote of the graph of $f(x) = \frac{x - 3}{3x - 5}$.
3. Find the intercepts, the vertical asymptote, and the horizontal asymptote of the graph of $f(x) = \frac{3x}{x^2 - 9}$.
4. Find the intercepts, the vertical asymptote, and the horizontal asymptote of the graph of $f(x) = \frac{2x + 5}{x^2 - 2}$.
5. Find the intercepts, the vertical asymptote, and the horizontal asymptote of the graph of $f(x) = \frac{3x + 4}{x^2 - 3}$.
6. Find the intercepts, the vertical asymptote, and the horizontal asymptote of the graph of $f(x) = \frac{3x + 4}{x^2 - x - 2}$.
7. Find the intercepts, the vertical asymptote, and the slant asymptote of the graph of $f(x) = \frac{x^2 - 2}{x + 1}$.
8. Find the intercepts, the vertical asymptote, and the slant asymptote of the graph of $f(x) = \frac{x^3 - 1}{x^2 - x + 1}$.

9. Sketch the graph of the function $f(x) = \frac{3x + 1}{x - 4}$.
10. Graph the function $f(x) = \frac{x}{x - 4}$. Identify all possible intercepts and asymptotes.
11. Graph the function $f(x) = \frac{x - 1}{x + 1}$. Identify all possible intercepts and asymptotes.
12. Graph the function $f(x) = \frac{2x}{2x - 3}$. Identify all possible intercepts and asymptotes.
13. Graph the function $f(x) = \frac{3x + 1}{x^2 - 4}$. Identify all possible intercepts and asymptotes.
14. Graph the function $f(x) = \frac{1}{x^2 - 4}$. Identify all possible intercepts and asymptotes.
15. Graph the function $f(x) = \frac{3}{(x - 1)^2}$. Identify all possible intercepts and asymptotes.
16. The horizontal and the vertical asymptotes of $f(x) = \frac{x - 2}{x^2 - 4x + 3}$ are
- (a) Horizontal: $y = 0$; vertical: $x = 1, x = 3$
 - (b) Horizontal: $y = 2$; vertical: $x = 1, x = 3$
 - (c) Horizontal: $y = 0$; vertical: $x = 2$
 - (d) None of the above.
17. The horizontal and the vertical asymptotes of $f(x) = \frac{3x + 1}{x^2 - 4x}$ are
- (a) Horizontal: $y = 0$; vertical: $x = 0, x = 4$
 - (b) Horizontal: $y = 3$; vertical: $x = 4$
 - (c) Horizontal: $y = 0$; vertical: $x = 1/3, 4$
 - (d) None of the above.
18. The horizontal and the vertical asymptotes of $f(x) = \frac{x^2 - 5}{x^2 + 4}$ are
- (a) Horizontal: $y = 0$; vertical: $x = \pm 2$
 - (b) Horizontal: $y = 1$; vertical: $x = \pm \sqrt{5}$
 - (c) Horizontal: $y = 1$; vertical: none
 - (d) None of the above
19. Use your graphing calculator to sketch the graph of the function $f(x) = \frac{3x}{x^2 + 1}$.
20. Use your graphing calculator to sketch the graph of the function $f(x) = \frac{3x + 1}{x^2 - x}$.

Exercise Set 5.2

1. Find an equation of the circle with center at $(-1, 4)$ and radius 3.
2. Find an equation of the circle with center at $(1/2, 1/2)$ and radius 1.
3. Find an equation of the circle with center at $(-2, 0)$ and radius 2.
4. Find an equation of the circle with center at $(0, 4)$ and which is tangent to the x -axis.
5. The end points of a diameter of a circle are $(-2, 3)$ and $(4, 5)$. Write the equation of this circle in the standard form.
6. Find an equation of the circle which has center at $(-1, -1)$ and passes through the origin $(0, 0)$.
7. Write the equation of the circle $x^2 + y^2 - 4x - 2y + 4 = 0$ in the standard form and find its center and radius.
8. Write the equation of the circle $x^2 + y^2 + 6x = 0$ in the standard form and find its center and radius.
9. Write the equation of the circle $x^2 + y^2 - 2y = 0$ in the standard form and find its center and radius.
10. Write the equation of the circle $2x^2 + 2y^2 - 4x + 8y + 4 = 0$ in the standard form and find its center and radius.
11. Write the equation of the circle $3x^2 + 3y^2 - 3x + 12y + 12 = 0$ in the standard form and find its center and radius.
12. The area of the circle $x^2 + y^2 - 2x - y + 1 = 0$ is
 - (a) $1/4$
 - (b) 3π
 - (c) $\pi/4$
 - (d) None of these.
13. The area of the circle $x^2 + y^2 - 6x + 8y = 0$ is
 - (a) 64
 - (b) 25π
 - (c) $\pi/5$
 - (d) None of these.
14. The circumferences of the circle $x^2 + y^2 + 6x - 8y = 0$ is
 - (a) 25
 - (b) 5π
 - (c) 10π
 - (d) None of the above.
15. The circles whose equations are $x^2 + y^2 = 9$ and $3x^2 + 3y^2 - 1 = 0$ have
 - (a) the same center.
 - (b) the same area.
 - (c) the same circumference.
 - (d) none of the above.
16. The circles whose equations are $x^2 + y^2 = 4$ and $x^2 + y^2 - 2x - 2y - 2 = 0$ have
 - (a) the same center.
 - (b) the same area.
 - (c) the same circumference.
 - (d) none of the above.

17. The end points of a diameter of a circle are $(0, 0)$ and $(4, 6)$. Find its equation.
 (a) $(x - 2)^2 + (y - 3)^2 = 13$ (b) $x^2 + y^2 = 52$
 (c) $x^2 + y^2 + 8x + 12y = 52$ (d) None of the above.
18. A circle is tangent to the x -axis at $(4, 0)$ and tangent to the y -axis at $(0, 4)$. Find its equation.
 (a) $(x - 2)^2 + (y - 4)^2 = 16$ (b) $(x - 4)^2 + y^2 = 16$
 (c) $x^2 + (y - 4)^2 = 17$ (d) None of the above.
19. A circle is tangent to the x -axis at $(6, 0)$ and its radius is 3. Find its equation.
 (a) $x^2 + y^2 = 9$ (b) $(x - 6)^2 + y^2 = 9$
 (c) $(x - 6)^2 + (y - 3)^2 = 9$ (d) None of the above.
20. The equation of a circle with center at $(1/2, 3/4)$ and radius $3\sqrt{2}$ is
 (a) $(x + 1/2)^2 + (y + 3/4)^2 = 3\sqrt{2}$ (b) $(x - 1/2)^2 + (y - 3/4)^2 = 18$
 (c) $(x - 1/2)^2 + (y - 3/4)^2 = 3\sqrt{2}$ (d) None of the above.

Exercise Set 5.3

- Find the focus and directrix of the parabola $y^2 = 6x$, and sketch its graph.
- Find the focus and the directrix of the parabola $x^2 + 10y = 0$, and sketch its graph.
- Find the focus and the directrix of the parabola $3x^2 - 2y = 0$, and sketch its graph.
- Find the focus and the directrix of the parabola $3y^2 + 4x = 0$, and sketch its graph.
- Find the focus and the directrix of the parabola $16x^2 - y = 0$, and sketch its graph.
- Determine the equation of the parabola that has vertex at the origin and has focus at $(3, 0)$.
- Determine the equation of the parabola that has vertex at the origin and has focus $(0, -4)$.
- Determine the equation of the parabola that has vertex at the origin and has focus $(-8, 0)$.
- Determine the equation of the parabola that has vertex at the origin and focus at $(0, 6)$.
- Determine the equation of the parabola that has directrix the line $y = 3$ and has focus at $(0, -3)$.
- Determine the equation of the parabola that has directrix the line $x = -12$ and has focus at $(12, 0)$.
- Determine the equation of the parabola that has vertex at the origin, axis of symmetry is the y -axis, and passes through the point $(2, 8)$.
- Determine the equation of the parabola that has vertex at the origin, axis of symmetry is the x -axis, and passes through the point $(12, 2)$.

14. Determine the equation of the parabola that has vertex at the origin, axis of symmetry is the x -axis, and passes through the point $(-9, 2)$.
15. Determine the equation of the parabola that has vertex at the origin, axis of symmetry is the y -axis, and passes through the point $(1, -8)$. Also, sketch the graph of this parabola.
16. Determine the equation of the parabola that has vertex at the origin, axis of symmetry is the y -axis, and passes through the point $(2, 8)$. Also, sketch the graph of this parabola.
17. Express the equation of the parabola $x^2 - 2x + y = 0$ in the standard form. Determine the axis, the vertex and sketch its graph.
18. Express the equation of the parabola $y^2 + 4y - 4x = 0$ in the standard form. Determine the axis, the vertex and sketch its graph.
19. Express the equation of the parabola $2x^2 + 4x - 3y - 1 = 0$ in the standard form. Determine the vertex, the axis and sketch its graph.
20. Express the equation of the parabola $y^2 - 3x + 6 = 0$ in the standard form. Determine the vertex, the axis and sketch its graph.

Exercise Set 5.4

1. Write the equation $4x^2 + 25y^2 = 100$ in the standard form. Find all the intercepts and vertices, and sketch the graph of this ellipse.
2. Write the equation $9x^2 + 16y^2 = 144$ in the standard form. Find all the intercepts and vertices, and sketch the graph of this ellipse.
3. Write the equation $x^2 + 25y^2 = 100$ in the standard form. Find all the intercepts and vertices, and sketch the graph of this ellipse.
4. Write the equation $9x^2 + y^2 = 36$ in the standard form. Find all the intercepts and vertices, and sketch the graph of this ellipse.
5. Write the equation $4x^2 + 9y^2 = 225$ in the standard form. Find all the intercepts and vertices, and sketch the graph of this ellipse.
6. Write the equation $100x^2 + 36y^2 = 100$ in the standard form. Find all the intercepts and vertices, and sketch this ellipse.
7. Find all the intercepts and vertices, and sketch the graph of the ellipse $\frac{x^2}{2} + \frac{y^2}{5} = 1$.
8. Find all the intercepts and vertices, and sketch the graph of the ellipse $\frac{x^2}{4} + \frac{y^2}{8} = 1$.

9. Find all the intercepts and vertices, and sketch the graph of the ellipse $\frac{x^2}{6} + \frac{y^2}{9} = 1$.
10. Find all the intercepts and vertices, and sketch the graph of the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$.
11. Use the asymptotes and the intercepts to sketch the graph of the hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$.
12. Use the asymptotes and the intercepts to sketch the graph of the hyperbola $\frac{x^2}{1} - \frac{y^2}{9} = 1$.
13. Use the asymptotes and the intercepts to sketch the graph of the hyperbola $\frac{y^2}{36} - \frac{x^2}{16} = 1$.
14. Use the asymptotes and the intercepts to sketch the graph of the hyperbola $\frac{y^2}{100} - \frac{x^2}{1} = 1$.
15. Use the asymptotes and the intercepts to sketch the graph of the hyperbola $y^2 - 9x^2 = 36$.
16. Use the asymptotes and the intercepts to sketch the graph of the hyperbola $4x^2 - 9y^2 = 36$.
17. Use the asymptotes and the intercepts to sketch the graph of the hyperbola $9x^2 - 16y^2 = 144$.
18. Use the asymptotes and the intercepts to sketch the graph of the hyperbola $x^2 - y^2 = 1$.
19. Use the asymptotes and the intercepts to sketch the graph of the hyperbola $3y^2 - 16x^2 = 48$.
20. Use the asymptotes and the intercepts to sketch the graph of the hyperbola $2x^2 - 9y^2 = 18$.

Exercise Set 5.5

1. Identify (without graphing) the graph of the equation $3x^2 + 4y^2 - 6x + 8y - 5 = 0$ as
(a) a parabola (b) an ellipse (c) a circle (d) a hyperbola (e) a pair of lines.
2. Identify (without graphing) the graph of the equation $3x^2 + 3y^2 - 3x + 9y - 1 = 0$ as
(a) a parabola (b) an ellipse (c) a circle (d) a hyperbola (e) a pair of lines.
3. Identify (without graphing) the graph of the equation $x^2 - 4y^2 + 4x - 8y - 9 = 0$ as
(a) a parabola (b) an ellipse (c) a circle (d) a hyperbola (e) a pair of lines.
4. Identify (without graphing) the graph of the equation $3x^2 - 4y^2 = 0$ as
(a) a parabola (b) an ellipse (c) a circle (d) a hyperbola (e) a pair of lines

5. Identify (without graphing) the graph of the equation $3x^2 - 6x + 8y - 5 = 0$ as
(a) a parabola (b) an ellipse (c) a circle (d) a hyperbola (e) a pair of lines
6. Express the equation $x^2 - 3y^2 + 2x - 12y = 20$ in the standard form, and (without graphing) identify the conic section.
7. Express the equation $5x^2 + 2y^2 + 20x - 6y = 1$ in the standard form, and (without graphing) identify the conic section.
8. Express the equation $3x^2 + 3y^2 + 12x - 18y = 10$ in the standard form, and (without graphing) identify the conic section.
9. Express the equation $-3y^2 + 2x + 6y = 2$ in the standard form, and (without graphing) identify the conic section.
10. Express the equation $-5x^2 + 15x - y = 15$ in the standard form, and (without graphing) identify the conic section.
11. Find the center of the ellipse $x^2 + 4y^2 - 6x + 8y - 6 = 0$.
12. Find the center of the ellipse $5x^2 + 3y^2 + 10x - 12y + 4 = 0$.
13. Find the center of the hyperbola $x^2 - y^2 - 2x - 4y - 4 = 0$.
14. Find the center of the hyperbola $2y^2 - 3x^2 + 6y - 4 = 0$.
15. Find the asymptotes of the hyperbola $x^2 - (y - 2)^2 = 4$.
16. Find the asymptotes of the hyperbola $4(x - 1)^2 - 9(y + 2)^2 = 36$.
17. Find the asymptotes of the hyperbola $16y^2 - 25(x - 3)^2 = 400$.
18. Find the vertex, axis and the directrix of the parabola $y^2 + 2y + 4x + 25 = 0$.
19. Find the vertex and the axis of the parabola $x^2 + 2x - 4y + 13 = 0$.
20. Find the vertex and the axis of the parabola $y^2 - 4x + 8 = 0$.