161 Sample Final

1. Find the distance between the points (1, 4) and (-2, 7), and find the midpoint of the line segment joining them.

2. Find the equation for the circle with center (2,-3) and radius 4.

3. Find the center and radius of the circle given by the equation $x^2 + 2x + y^2 - 6y = 6$

4. What is the equation of the unit circle?

5. Graph the equation $y = |x - 2|$

6. Solve the inequality $|2x - 3| \le 5$

7. Solve the inequality $x^2 - x \le 6$

8. Find the domain of the function $f(x) = \dfrac{\sqrt{x-2}}{x^2 - 9}$

9. Find the equation of the line through the points (1,2) and (5, -12).

10. Find the equation of the line with slope –2 through the point (1,6)

11. Graph a line with slope m = -2

12. The equation of the x – axis is _____ and the equation of the y – axis is _____

Let $f(x) = 1 - x^2$, $g(x) = x + 1$

13. Find $(f + g)(2)$, $\dfrac{f}{g}(1)$, $g \circ f$, $f \circ g$.

14. What is the domain of $\dfrac{f}{g}$?

For each of the following functions, determine the formulas for $f(-x)$ and $-f(x)$

15. $f(x) = x^2 - 1$

16. $f(x) = \dfrac{1 - x^2}{x}$

17. $f(x) = |x - 1| + x^2$

18. Which, if any, of the above functions are even, and which are odd?

19. What property must a function have for it to have an inverse?

20. Find the inverse of the function $f(x) = \dfrac{3x+4}{5}$

21. Find the inverse of the function $f(x) = \dfrac{x}{x+1}$

22. Definition: a function is **one to one** if _____

Let $f(x) = -x^2 + 3x - 1$

23. Find the vertex of *f*.

24. Find the *x* – intercepts of *f*.

25. Graph $y = f(x)$

Let $f(x) = x^3 - 7x + 6$

26. Show that $f(2) = 0$

27. Factor *f* completely.

28. Graph $y = f(x)$

29. Find the horizontal and vertical asymptotes of the rational functions

$$f(x) = \frac{3}{2-x}, \quad g(x) = \frac{x^2 - 2x}{x+1}, \qquad h(x) = \frac{x-1}{x^2 - 1}$$

30. Find the *x* – intercepts of the above rational functions.

31. Find the slant asymptote of *g*.

32. Graph each of the above functions.

EXAMPLES

33. Give an example of an even function, an odd function, and a function that is neither.

34. Give an example of a one to one function, and a function that is not one to one.

35. Give an example of a polynomial of degree 2 with vertex (1,-3).

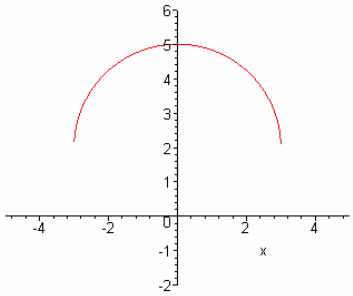
36. Give an example of a polynomial of degree 3 with negative leading coefficient and 2 real zeros.

37. Give an example of a rational function with vertical asymptote and $x = 1$ and horizontal asymptote at $y = 3$.

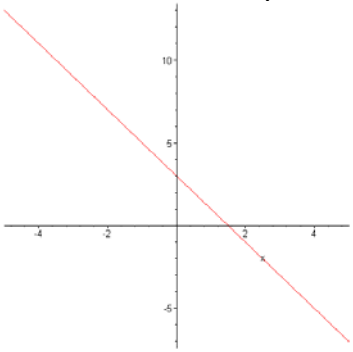
38. Give an example of a rational function with no vertical asymptote and horizontal asymptote at $y = 0$.

GRAPHS

39. Determine the domain and range of the function graphed below.



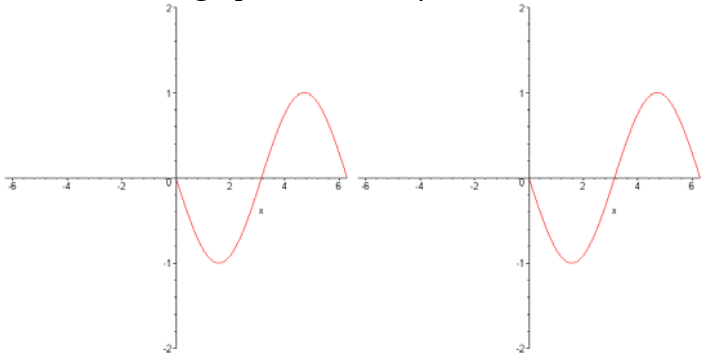
40. Determine the equation for the line graphed below



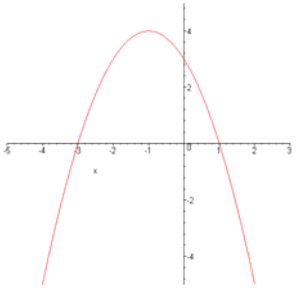
The graph of the function f below is given for $x > 0$.

41. Extend the graph for $x < 0$ if f is even.

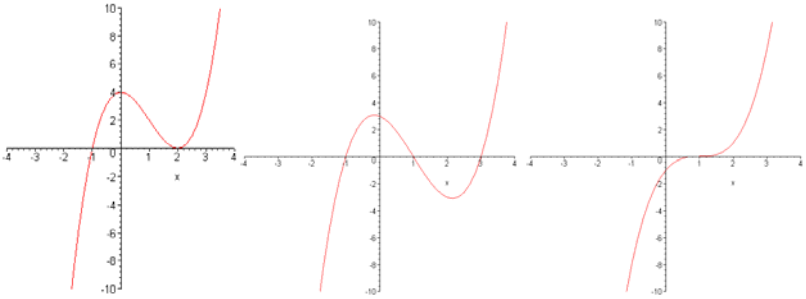
42. Extend the graph for $x < 0$ if f is odd.



43. Find the equation of the quadratic function graphed below.



44. Assuming that the following are the graphs of third degree polynomials with leading coefficient 1, give the equation for each of the graphs:



45. Find the horizontal and vertical asymptotes, if any, of the following rational functions