Please do all your work on a separate piece of paper. Please show all setup and work!

Sketch the graph of the quadratic function without using a graphing utility. Identify the vertex and x-intercepts.

1. $f(x) = 25 - x^2$
2. $f(x) = (x-6)^2 + 3$

Find the quadratic function that has the indicated vertex and whose graph passes through the given point.

3. Vertex: (4, -1) Point: (2 , 3)

4. Vertex: $\left(-\frac{1}{4}, \frac{3}{2}\right)$ Point: (-2 , 0)

Word problems

5. Find the number of units sold that produces a maximum revenue of $R = 900x - 0.1x^2$ where R is the total revenue (in dollars) and x is the number of units sold.

6. Find two positive real numbers whose product is a maximum if the sum of the first and twice the second is 24.

Determine the right-hand and left-hand behavior of the graph of the polynomial function.

7. $f(x) = \frac{1}{3}x^3 + 5x$

8. $h(t) = -\frac{2}{3}\left(t^2 - 5t + 3\right)$

Find all the real zeros of the polynomial function.

9. $f(x) = x^2 - 25$
10. $f(x) = 3x^2 - 12x + 3$
11. $g(t) = \frac{1}{2}t^4 - \frac{1}{2}$
12. $f(x) = x^3 - 4x^2 - 25x + 100$

Find a polynomial function that has the given zeros. (Hint: Write each term as a factor and then multiply).

13. 0, 10

14. − 4 , 5, 1

15. 4 , - 3, 3, 0

Sketch the graph of the function by (a) applying the Leading Coefficient Test, (b) finding the zeros of the polynomial, (c) plotting sufficient solution points, and (d) drawing a continuous curve through the points.

16. $f(x) = x^3 - 9x$

17. $f(x) = -48x^2 + 3x^4$

18. $f(x) = x^3 - 3x^2 - x + 3$