Describe the end behavior of each graph.

1. $f(x) = -3x^3 - 4x^2 + 7$

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

3. $f(x) = 3x^3 - 9x^2 + 24x - 15$

4. $f(x) = 2x^2 - 6x + 11$

5. $f(x) = -5x^5 - 4x^3 + 5x + 2$

6. $f(x) = -x^2 + 4x$

7. $f(x) = 2x^2 + 12x + 12$

8. $f(x) = x^2 - 8x + 18$

State the maximum number of turns each function could make.
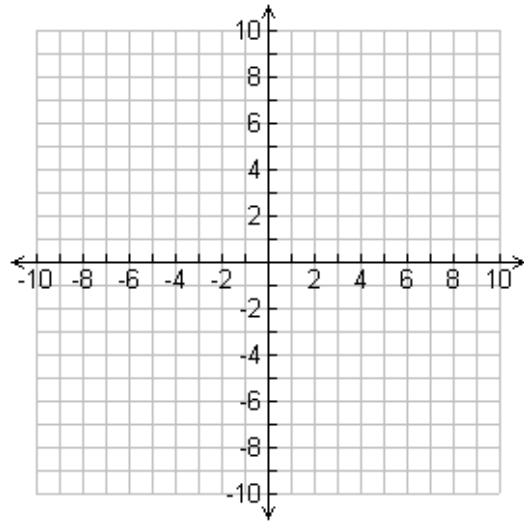
9. $f(x) = x^5 - 4x^3 + 5x + 1$

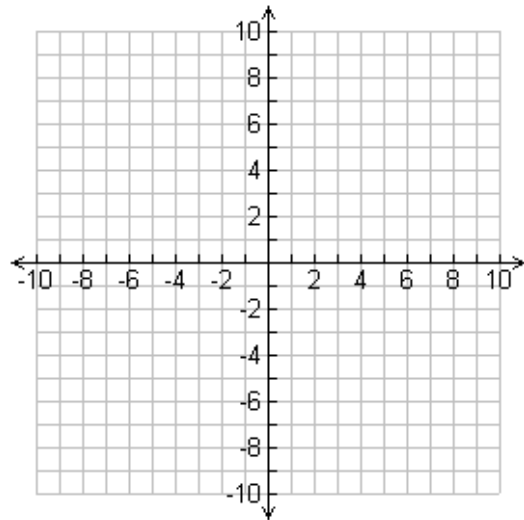10. $f(x) = -2x^2 + 3$

11. $f(x) = x^7 + 3x^5 - 4x^2 - 8$

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

Without using a calculator, do the following: a) identify the leading coefficient and end behavior b) find the zeros and their multiplicity c) find the y-intercept d) sketch the graph using parts a-c.
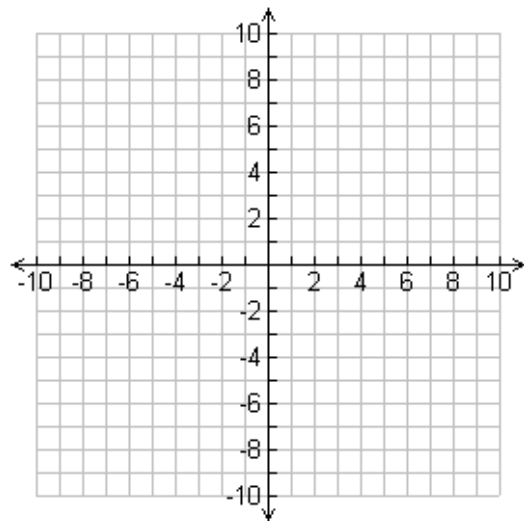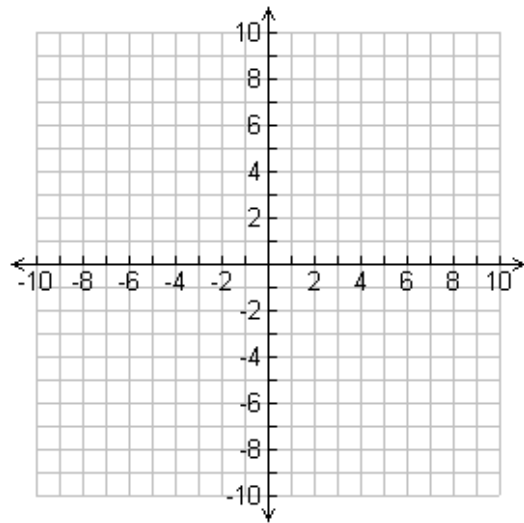
21. $f(x) = \frac{1}{2}(x - 4)(x - 1)(x + 3)$

22. $f(x) = -\frac{1}{2}(x + 1)(x - 2)^2(x - 4)$

23. $f(x) = -x^{3(2x-3)}$

24. $f(x) = \frac{1}{9}(x-2)^3(x+3)^2$

25. $f(x) = x^3 - 2x^2 - 4x + 8$