

Graphing Polynomials

Without graphing, determine the end behavior of each polynomial. **Write answers in limit notation.** Determine the number of zeros.

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

2. $f(x) = -3x^6 - 8x^5 + 2x$

3. $f(x) = 4x^7 + 5$

4. $f(x) = -10x^3 - 3x^2 - 5$

5. $f(x) = -6x^{10} + 5x^4 - 5x^3 + 9$

6. $f(x) = 8x^4 + 10x^3 + 3x - 4$

For each polynomial below:

- Identify the zeros and their multiplicity
- Determine whether the graph touches or crosses the x-axis at each zero.

7. $f(x) = (x+1)^4(x-5)^3$

Zero	Multiplicity	Touch/Cross

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

Zero	Multiplicity	Touch/Cross

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

Zero	Multiplicity	Touch/Cross

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

Zero	Multiplicity	Touch/Cross

11. $f(x) = (x-4)(x+5)^3(x-1)^2$

Zero	Multiplicity	Touch/Cross

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

Zero	Multiplicity	Touch/Cross

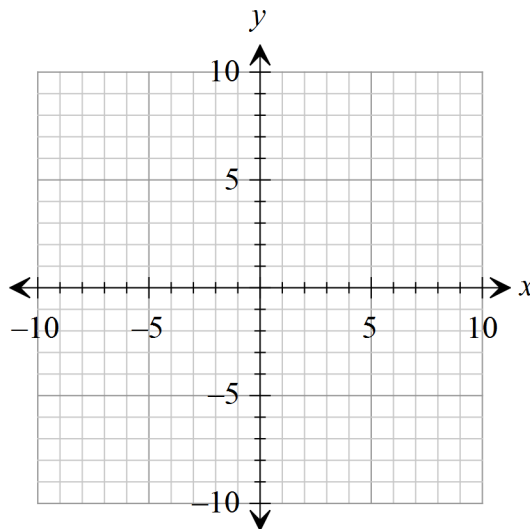
Graph each function without a calculator. Start by factoring to find the zeros. Then fill out the chart for multiplicity and whether each zero touches or crosses the x-axis. Find the end behavior. Finally sketch the graph (don't worry about the height of the maximums and minimums).

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

Zero	Multiplicity	Touch/Cross

$$\lim_{x \rightarrow -\infty} f(x) =$$

$$\lim_{x \rightarrow +\infty} f(x) =$$

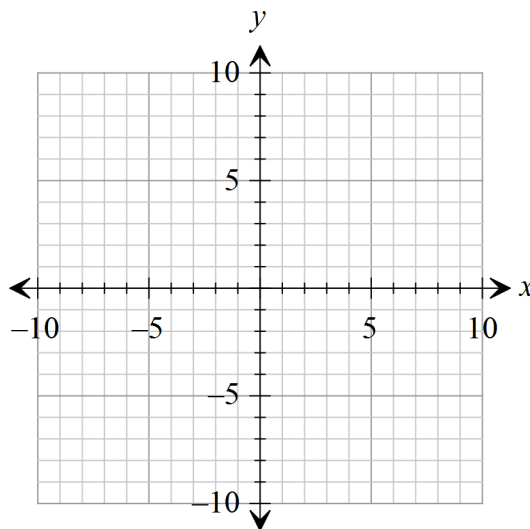


14. $f(x) = -x(x-3)^2$

Zero	Multiplicity	Touch/Cross

$$\lim_{x \rightarrow -\infty} f(x) =$$

$$\lim_{x \rightarrow +\infty} f(x) =$$

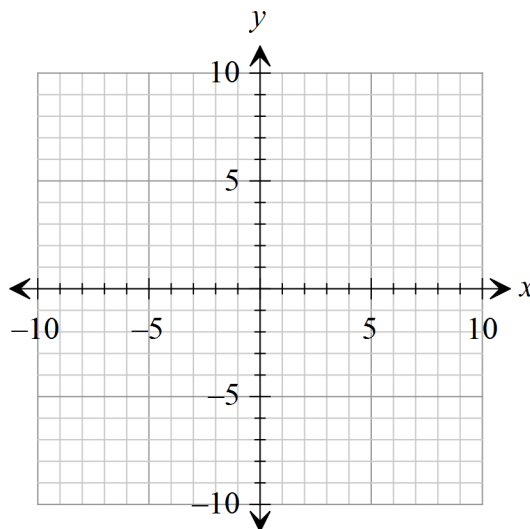


15. $f(x) = x^2 + 2x - 8$ (hint: remember to factor)

Zero	Multiplicity	Touch/Cross

$$\lim_{x \rightarrow -\infty} f(x) =$$

$$\lim_{x \rightarrow +\infty} f(x) =$$

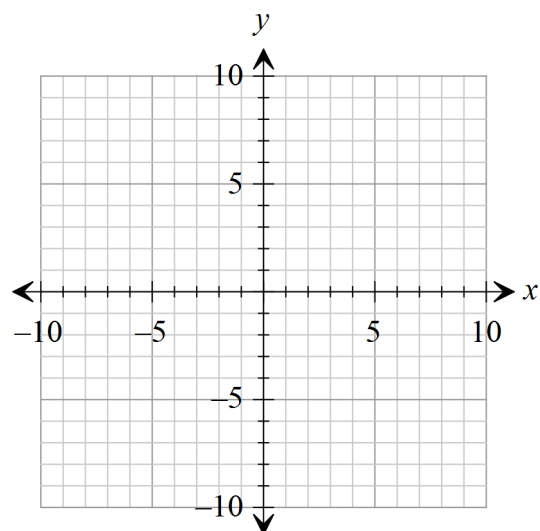


16. $f(x) = 3x^3 - x^2 - 2x$ (hint: remember to factor after you take out the GCF)

Zero	Multiplicity	Touch/Cross

$$\lim_{x \rightarrow -\infty} f(x) =$$

$$\lim_{x \rightarrow +\infty} f(x) =$$

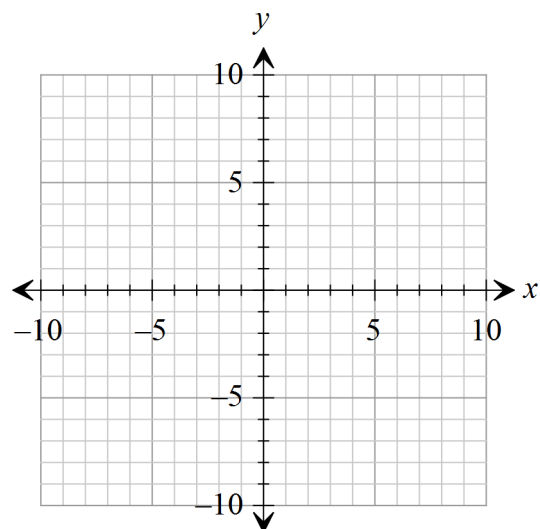


17. $f(x) = x^3 - 25x$ (hint: remember to factor after you take out the GCF)

Zero	Multiplicity	Touch/Cross

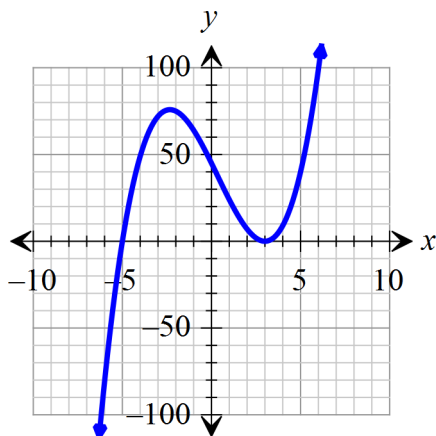
$$\lim_{x \rightarrow -\infty} f(x) =$$

$$\lim_{x \rightarrow +\infty} f(x) =$$

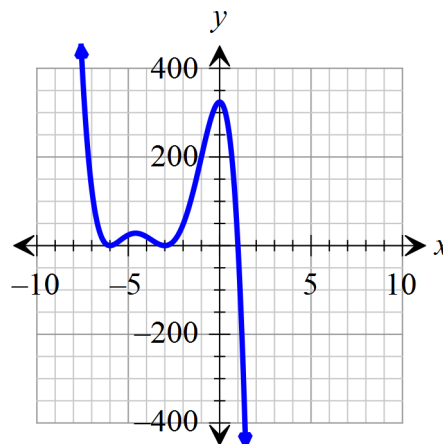


Given the graph, write the equation using the lowest exponents possible.

18. Equation: _____



19. Equation: _____



Match the polynomial function with its graph (without a graphing calculator!). Explain your choice.

20. $f(x) = 7x^3 - 21x^2 - 91x + 104$ _____

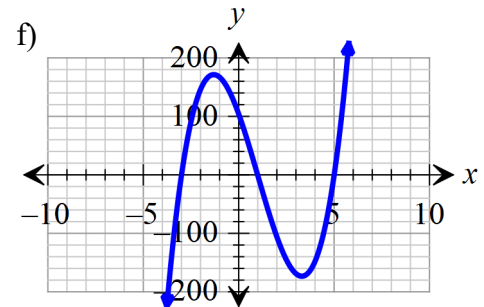
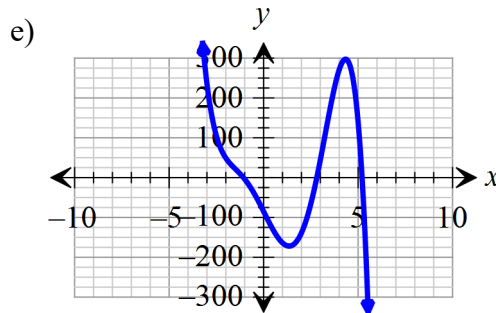
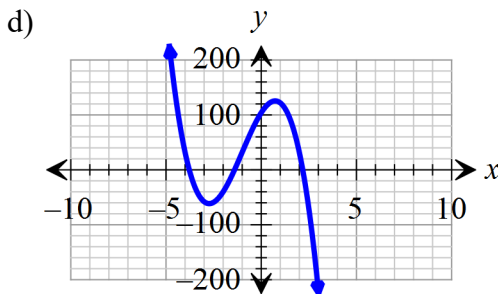
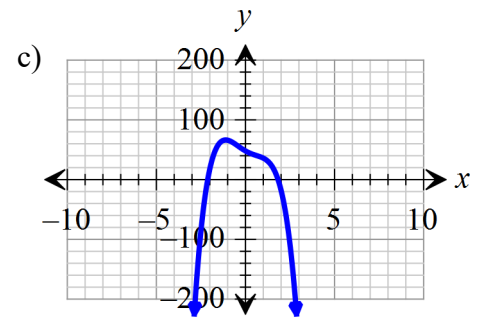
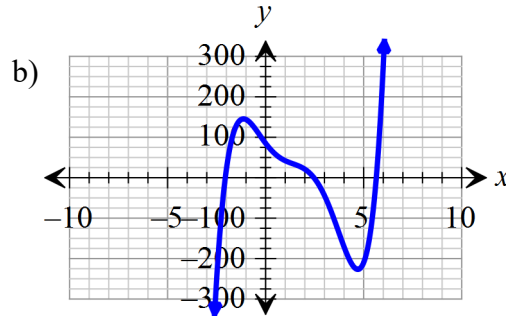
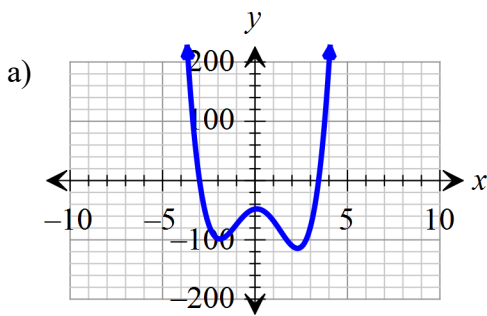
21. $f(x) = -9x^3 + 27x^2 + 54x + 104$ _____

22. $f(x) = 3x^4 - 2x^3 - 26x^2 + 5x - 48$ _____

23. $f(x) = -5x^4 + 2x^3 + 8x^2 - 17x + 48$ _____

24. $f(x) = x^5 - 8x^4 + 9x^3 + 58x^2 - 164x + 85$ _____

25. $f(x) = -x^5 + 3x^4 + 16x^3 - 2x^2 - 95x - 85$ _____



Find the zeros of the polynomial.

26. $f(x) = 3x^2 - 6x - 24$