

1. Is each a polynomial?

- a) $y = -4x^2 - 6x$ b) $f(x) = 7\sqrt{x} + 3x^5$ c) $y = 6x^4 - 7x^{-2} + 3$ d) $f(x) = 3x^{\frac{1}{2}} + 2x$
- e) $y = -2.67x^2 - 7x + \sqrt{3}$ f) $f(x) = 9x^4 + \frac{5}{x^3} - 8x^2$ g) $y = 2x^2 - 3ix + 8$

2. Name each polynomial by its degree and by the number of terms.

- a) $f(x) = 9x^3$ b) $y = 7x^2 - 6x + 1$ c) $f(x) = 4x + 10$ d) 23

3. State the degree, leading coefficient, and the end behavior of each polynomial.

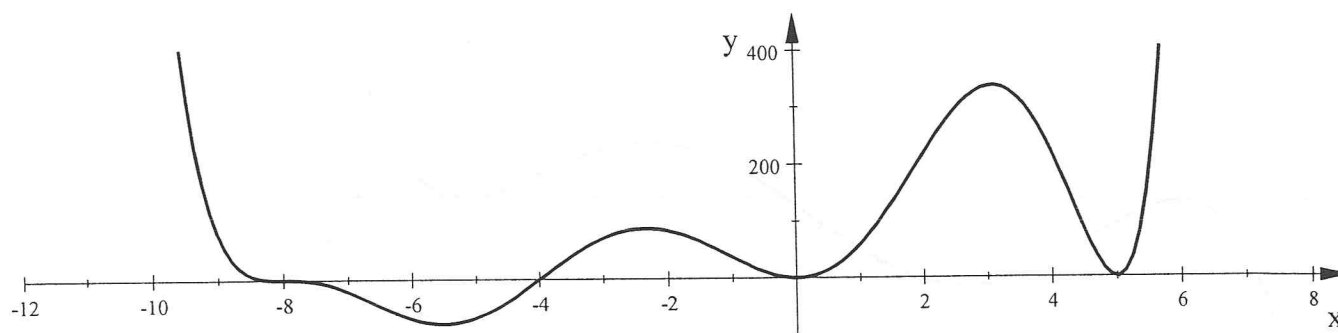
- a) $y = 6x^3 - 9x^2 - 2x + 1$ b) $f(x) = 2x(7x - 3)^2(x + 2)^3(x - 1)$
- c) $y = 7x^3 - 19x - 3x^4 + 3$ d) $f(x) = (2x + 7)^2(2 - x)^3(5x + 4)^2$

4. Sketch each function showing the proper end behavior and shape at each zero.

a) $f(x) = x^2(x + 6)^3(4 - x)(x - 8)^2$

b) $y = (x + 2)^2(2x - 7)(x - 8)^2$

5. Write a polynomial in factored form from the graph below.



6. Factor each.

- a) $2x^5 - 162x$ b) $16x^4 - 1$ c) $x^4 - 14x^2 - 32$ d) $3x^5 - 12x^3 - 63x$
- e) $4x^3 - 6x^2 + 14x - 21$ f) $x^3 - 125$ g) $8x^3 + 27$

7. Find all solutions, both real and imaginary. Give answers in simplified radical form where necessary

- a) $x^4 - x^2 - 12 = 0$ b) $5x^5 + 20x^3 - 60x = 0$ c) $2x^3 - 18x - 3x^2 + 27 = 0$ d) $8x^5 - 648x = 0$
- e) $64x^3 - 1 = 0$

1. a) Yes b) No c) No d) No e) Yes f) No g) No

2. Name by degree Name by # of terms

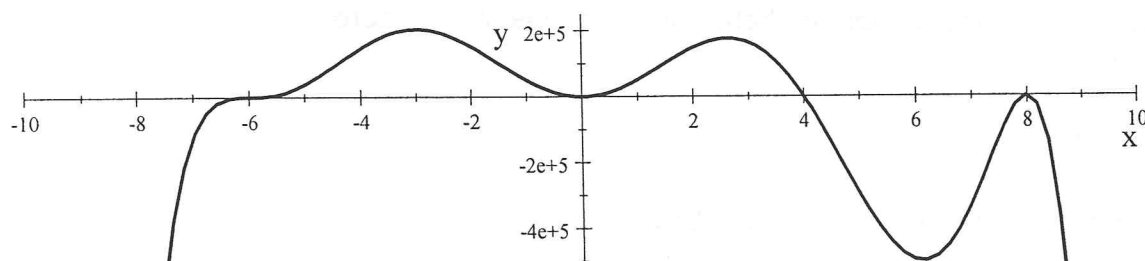
- | | |
|--------------|-----------|
| a) Cubic | Monomial |
| b) Quadratic | Trinomial |
| c) Linear | Binomial |
| d) Constant | Monomial |

3. a) Degree = 3 Leading Coefficient = -6
End Behavior ($\swarrow$, $\nearrow$)

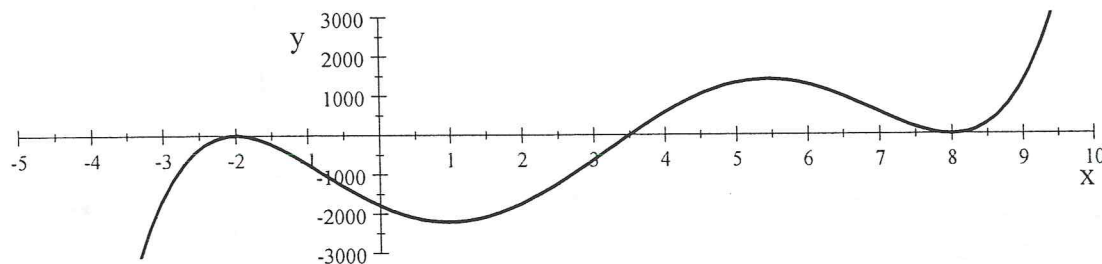
b) Degree = 6 Leading Coefficient = 98
End Behavior ($\nwarrow$, $\nearrow$)

c) Degree = 4 Leading Coefficient = -3
End Behavior ($\swarrow$, $\searrow$)

d) Degree = 7 Leading Coefficient = -100
End Behavior ($\nwarrow$, $\searrow$)



4. a)



4. b)

$$5. y = x^2(x-5)^2(x+4)(x+8)^3$$

$$6. a) 2x^5 - 162x = 2x(x-3)(x+3)(x^2+9)$$

$$b) 16x^4 - 1 = (2x-1)(2x+1)(4x^2+1)$$

$$c) x^4 - 14x^2 - 32 = (x+4)(x-4)(x^2+2)$$

$$d) 3x^5 - 12x^3 - 63x = 3x(x^2+3)(x^2-7)$$

$$e) 4x^3 - 6x^2 + 14x - 21 = (2x-3)(2x^2+7)$$

$$f) x^3 - 125 = (x-5)(5x+x^2+25)$$

$$g) 8x^3 + 27 = (2x+3)(4x^2-6x+9)$$

$$7. a) x^4 - x^2 - 12 = (x^2-4)(x^2+3) = (x-2)(x+2)(x^2+3) = 0, \text{ Solutions are: } x = \pm i\sqrt{3}, \pm 2$$

$$b) 5x^5 + 20x^3 - 60x = 5x(x^2+6)(x^2-2) = 0, \text{ Solutions are: } x = 0, \pm i\sqrt{6}, \pm \sqrt{2}$$

$$c) 2x^3 - 18x - 3x^2 + 27 = (x^2-9)(2x-3) = (x+3)(x-3)(2x-3) = 0, \text{ Solutions are: } x = \pm 3, \frac{3}{2}$$

$$d) 8x^5 - 648x = 8x(x-3)(x+3)(x^2+9) = 0, \text{ Solutions are } x = \pm 3, \pm 3i, 0$$