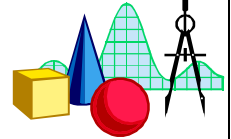




MATH DEPT. SOLUTION TO TUTORIAL 1



Solution 1: Special Products and Factoring: common factors, grouping, differences of squares and cubes, sum of cubes.

1. $(x+3)(x+4) = x^2 + 7x + 12$
2. $(x-5)(x+10) = x^2 + 5x - 50$
3. $(2x+3)^2 = 4x^2 + 12x + 9$
4. $(x+2y)(x-2y) = x^2 - 4y^2$
5. $(2x+3)(2x-3) = 4x^2 - 9$
6. $(x+1)^3 = x^3 + 3x^2 + 3x + 1$
7. $(x-4)^2 = x^2 - 8x + 16$
8. $(x-2)^3 = x^3 - 6x^2 + 12x - 8$
9. $(x-2)(x^2 + 2x + 4) = x^3 - 8$
10. $(3x+2y)^3 = 27x^3 + 54x^2y + 36xy^2 + 8y^3$
11. $(x-2y+z)(x-2y-z) = (x-2y)^2 - z^2 = x^2 - 4xy + 4y^2 - z^2$
12. $(x-y+3)(x-y-3) = (x-y)^2 - 9 = x^2 - 2xy + y^2 - 9$
13. $x^3 - 2x^2 - 3x + 6 = x^2(x-2) - 3(x-2) = (x^2-3)(x-2)$
14. $x^3 - 27 = (x-3)(x^2 + 3x + 9)$
15. $x^2 - 16 = (x-4)(x+4)$
16. $x^3 - 4x = x(x^2-4) = x(x-2)(x+2)$
17. $2y^3 - 7y^2 - 15y = y(2y^2 - 7y - 15) = y(2y+3)(y-5)$
18. $3z^2 + 10z + 8 = (3z+4)(z+2)$
19. $6x^3 + 12x^2 + 24x + 48 = 6x^2(x+2) + 24(x+2) = (6x^2 + 24)(x+2) = 6(x^2 + 4)(x+2)$
 Note also that $6x^3 + 12x^2 + 24x + 48 = 6x^3 + 24x + 12x^2 + 48 = 6x(x^2+4) + 12(x^2+4) = (6x+12)(x^2+4) = 6(x+2)(x^2+4)$
 showing that often we can group in more than one way.
20. $8t^3 - 1 = (2t-1)(4t^2 + 2t + 1)$
21. $3x^3 + x^2 + 15x + 5 = x^2(3x+1) + 5(3x+1) = (x^2+5)(3x+1)$
22. $2x^2 + 9x + 9 = (2x+3)(x+3)$
23. $2x^2 - x - 1 = (2x+1)(x-1)$
24. $t^3 + 8 = (t+2)(t^2 - 2t + 4)$
25. $w^2 + 10w + 25 = (w+5)^2$
26. $x^4 - 4x^3 + x^2 - 4x = x(x^3 - 4x^2 + x - 4) = x[x^2(x-4) + (x-4)] = x(x^2+1)(x-4)$
27. $25 - (y+5)^2 = [5 - (y+5)][5 + (y+5)] = -y(y+10)$
28. $x^6 - 3x^5 + 2x^2 - 6x = x^5(x-3) + 2x(x-3) = (x^5 + 2x)(x-3) = x(x^4+2)(x-3)$
29. $5x^3 + 40 = 5(x^3 + 8) = 5(x+2)(x^2 - 2x + 4)$
30. $x^3 - 1 + 3(x-1) = (x-1)(x^2+x+1) + 3(x-1) = (x^2+x+1+3)(x-1) = (x^2+x+4)(x-1)$
31. $(3x+2y)^2 + (3x+2y) - 12 = [(3x+2y)+4][(3x+2y)-3] = (3x+2y+4)(3x+2y-3)$
32. $x^6 + y^6 = (x^2)^3 + (y^2)^3 = [x^2 + y^2][(x^2)^2 - x^2y^2 + (y^2)^2] = (x^2 + y^2)(x^4 - x^2y^2 + y^4)$
33. $x^3 + x^2 - x - 1 = x^2(x+1) - 1(x+1) = (x^2 - 1)(x+1) = (x+1)(x-1)(x+1) = (x+1)(x-1)^2$