

Factor each expression completely.

1. $x^3 + x^2 - 6x$

$x(x^2 + x - 6)$

$x(x+3)(x-2)$

2. $2x^4 - 12x^3 + 18x^2$

$2x^2(x^2 - 6x + 9)$

$2x^2(x-3)(x-3)$

3. $10x^4 - 90x^2$

$10x^2(x^2 - 9)$

$10x^2(x+3)(x-3)$

4. $x^3 - 7x^2 + 12x$

$x(x^2 - 7x + 12)$

$x(x-3)(x-4)$

Factor each expression using the sum of cubes formula.

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$

5. $27x^3 + 125$
 $a^3 = (3x)^3$
 $b^3 = (5)^3$
 $(3x+5)(3x^2 - 3x(5) + 5^2)$
 $(3x+5)(9x^2 - 15x + 25)$

6. $8x^3 + 27$
 $a^3 = (2x)^3$
 $b^3 = (3)^3$
 $(2x+3)((2x)^2 - (2x)(3) + 3^2)$
 $= (2x+3)(4x^2 - 6x + 9)$

7. $8x^3 - 1$
 $a^3 = (2x)^3$
 $b^3 = (-1)^3$
 $(2x-1)((2x)^2 - (2x)(-1) + (-1)^2)$
 $(2x-1)(4x^2 + 2x + 1)$

8. $64 - x^3$
 $a^3 = (4)^3$
 $b^3 = (-x)^3$
 $(4+(-x))(4^2 - 4(-x) + (-x)^2)$
 $(4-x)(16 + 4x + x^2)$

Factor each expression by grouping.

9. $x^3 + 15x^2 - 6x - 30$

$x^2(x+5) - 6(x+5)$

$(x+5)(x^2 - 6)$

10. $7r^3 - 42r^2 - 3r + 18$

$7r^2(r-6) - 3(r-6)$

$(r-6)(7r^2 - 3)$

11. $5n^3 + 40n^2 - n - 8$

$5n^2(n+8) - 1(n+8)$

$(n+8)(5n^2 - 1)$

12. $6x^3 - x^2 + 42x + 7$

$x^2(6x-1) + 7(6x-1)$

$(6x-1)(x^2 + 7)$

Factor each quadratic form. Similar to

13. $x^4 + 16x^2 - 16$

$(x^2+8)(x^2-2)$

$x^2 + 6x - 16$

14. $m^4 - 1$

$(m^2-1)(m^2+1)$

$(m+1)(m-1)(m^2+1)$

Similar to $m^2 - 1$

15. $5a^5 + 55a^3 + 150a$

$5a(a^4 + 11a^2 + 30)$

$5a(a^2+5)(a^2+6)$

16. $4x^5 - 16x^3 + 12x$

$4x(x^4 - 4x^2 + 3)$

$4x(x^2-3)(x^2-1)$

$4x(x^2-3)(x-1)(x+1)$

diff of Perfect \square 's

