

# Combining Polynomials

If you have 2 polynomials that you need to combine, it is sometimes easier to leave them in factored form (rather than distributing it out & combining like terms)

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

$$g(x) = x^2 \cdot (x-4)(x+4)(x+7)^2$$

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

Both have  $(x+4), (x-4), (x+7)^2$ , factor out.

$$(x+4)(x-4)(x+7)^2((x-4)(x+7) + x^2)$$

$$(x+4)(x-4)(x+7)^2(x^2 + 3x - 28 + x^2)$$

$$(x+4)(x-4)(x+7)^2(2x^2 + 3x - 28)$$

Roots =  $-4, 4, -7$ , except  $-7$  is a bounce  
 $3^2 - 4(2)(-28) = 233$   
 Discriminant not perfect square, so can't factor further.

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

$$(x+4)(x-4)(x+7)^2((x-4)(x+7) - x^2)$$

$$(x+4)(x-4)(x+7)^2(x^2 + 3x - 28 - x^2)$$

$$(x+4)(x-4)(x+7)^2(3x - 28)$$

Roots =  $-4, 4, -7, \frac{28}{3}$   
 $-7$  is a bounce