Homework Review

Find the product.

1. $(z-4)(z+4)$

   z^2-16

2. $(z+3i)(z-3i)$

   $z+9$

3. $(z+\sqrt{13})(z-\sqrt{13})$

   $z-13$

4. $(z+\sqrt{5}i)(z-\sqrt{5}i)$

   $z+5$

Factor

5. z^2-144

   $(z-12)(z+12)$

6. y^2+16

   $(y+4i)(y-4i)$

7. z^2+15

   $(z+\sqrt{15}\,i)(z-\sqrt{15}\,i)$

8. t^2-9i

   $(t-3\sqrt{i})(t+3\sqrt{i}$

9. z^2+25i

   $(z+5\sqrt{i}\,i)(z-5\sqrt{i}\,i)$

Examples

11. Solve each equation, and state the solutions.

a. $x^2+64=0$

$(x+8i)(x-8i)=0$

$x=\pm 8i$

b. $x^2+10x+25=0$

$(x+5)(x+5)=0$

$x=-5$

12. Write the left side of each equation as a product of linear factors, and state the solutions.

a. $x^3 - 125 = 0$

$(x-5)(x^2+5x+25)=0$

$(x-5)\left(x-\left[\frac{-5+\sqrt{75}\,i}{2}\right]\right)\left(x-\left[\frac{-5-\sqrt{75}\,i}{2}\right]\right)=0$

$x = \frac{-5 \pm \sqrt{25-4(1)25}}{2}$

$x = \frac{-5 \pm \sqrt{-75}}{2} = \boxed{\frac{-5 \pm \sqrt{75}\,i}{2} \text{ and } x=5}$

b. $x^3 + 8 = 0$

c. $x^4 + 6x^2 + 8 = 0$

$(x^2+4)(x^2+2)=0$

$(x+2i)(x-2i)(x+\sqrt{2}i)(x-\sqrt{2}i)=0$

$x=\pm 2i$

$x=\pm\sqrt{2}i$

d. $x^4 + 9x^2 + 8 = 0$

$(x^2+8)(x^2+1)=0$

$(x+\sqrt{8}i)(x-\sqrt{8}i)(x+i)(x-i)=0$

$x=\pm\sqrt{8}i$

$x=\pm i$

Fully expand the function $(2x-y)^4$.

$(2x)^4+4(2x)^3(-y)+6(2x)^2(-y)^2+4(2x)(-y)^3+(-y)^4$

$16x^4-32x^3y+24x^2y^2-8xy^3+y^4$

What is the coefficient in front of the x^6y term in the expansion of $(x+2y)^7$?

The term would be the 1^{st} term of 7^{th} row

1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1
1 6 15 20 15 6 1

$6x^6(2y)$ can't forget the 2.

So $12x^6y$

12

What is the maximum number of solutions that the equation $3x^6 + 5x^6 - 2x^5 + 4x^2 - 2x + 1 = 0$ has?

6 b/c the expression is a 6^{th} degree polynomial.

On what intervals is the function $y = (x-3)(x+1)^2(x+5)$ positive?

zeros: $x = 3, -1, -5$

$-5 \quad -1 \quad 3$

	+	−	−	+
$x-3$	−	−	−	+
$(x+1)^2$	+	+	+	+
$x+5$	−	+	+	+

always +

$+: (-\infty, -5)\ (3, \infty)$