SM 3H

DATE: 9/7/23 SECTION: 1.6

OBJECTIVE: I can write equations from the zeros. I can simplify complex numbers.

EXAMPLES:

Write an equation in factored form and standard form for the function with the given zeros.

1. $x = -7, x = \frac{1}{2}$

since it says eqs. must have $= f(x)$

$x=-7$ → $+7\ +7$ → $x+7=0$

$2\left(x=\frac{1}{2}\right)$ → $2x=1$ → $-1\ -1$ → $2x-1=0$

now get eq to $=0$

don't need to show any of this work do it in your head

factors

factored form: $f(x)=(x+7)(2x-1)$

notice there is not a fraction in the factor. CANNOT have fraction in factor.

multiply to get standard form

s.f.: $f(x)=x^2+13x-7$

2. $x = 2$ (multiplicity of 2), $x = -3$

★ you do NOT need to show any work here

$x=2$ → $-2\ -2$ → $x-2=0$

$x=-3$ → $+3\ +3$ → $x+3=0$

factors

f.f. ⟵ $(x-2)^2(x+3)=f(x)$

mult to get standard

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

$x^3-x^2-8x+12=f(x)$

s.f.

Find the zeros of each polynomial.

1. $f(x) = 3x(x+2)(5x-4)$

$x=0, -2, \frac{4}{5}$

2. $f(x) = x^3 - 64x$

$=x(x-64)$

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

$x=0, 8, -8$

Simplify. (This means there are no DECIMALS **in the answer.)**

1. $\sqrt{24}$

$4\ 6$

no work necessary

$2\sqrt{6}$

2. $\sqrt{-24}$

$4\ 6$

$2i\sqrt{6}$

3. $3\sqrt{121}$

$11\ 11$

33

4. $\frac{8\pm\sqrt{12}}{6}$

all have GCF so simplify ✓ doesn't count

$\frac{8\pm2\sqrt{3}}{6}$

$\frac{4\pm\sqrt{3}}{3}$

5. $\frac{6\pm\sqrt{-18}}{3}$

$\frac{6\pm3i\sqrt{2}}{3}$

$2\pm i\sqrt{2}$

Simplify complex numbers

Remember $i^2 =$ ___

EXAMPLES:

Simplify.

6. $(5i)(2i)$

$10i^2$

$10(-1)$

-10

← don't need work

7. $(3-2i)(-4+i)$

need at least 1 step of work

$-12-2i^2+8i+3i$

$-12+2$

$-10+11i$

must be in standard form $a+bi$

$a+bi$

$a=-10 \quad b=11$

8. $(x-2-i)(x-2+i)$

	x	-2	$+i$
x	x^2	$-2x$	xi
-2	$-2x$	$+4$	$-2i$
$-i$	$-xi$	$2i$	$-i^2=1$

these are conjugates which means same # but opp signs on last term

add like terms

x^2-4x+5

9. $(x-4-3i)(x-4+3i)$ – conjugates

distribute or memorize the pattern

$a=+4 \quad b=3$ – don't care about sign

do opp

no leading coef

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

$x^2-8x+25$

conjugates

Identity (not necessary to memorize): $(x-a+bi)(x-a-bi)=x^2-2ax+(a^2+b^2)$

Factor.

1. $f(x)=x^2+6x+10$

10, 6 — none

so Quadratic Formula OR do identity backwards

way 1

$x=\frac{-6\pm\sqrt{6^2-4(1)(10)}}{2(1)}$

$x=\frac{6\pm\sqrt{-4}}{2}$

$x=\frac{6\pm 2i}{2}$

$x=3\pm i$

$x=3+i \quad x=3-i$

$-3 \quad -3 \quad -3 \quad -3$

$x-3=i \quad x-3=-i$

$+i \quad +i \quad +i \quad +i$

$x-3+i=0 \quad x-3+i=0$

factors

way 2

$x^2-2ax+(a^2+b^2)$

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

makes 6

$9+?=10$

$a+i=10$

then $\sqrt{}$ each # to get a and b

$(x-3+i)(x-3-i)=f(x)$

2. $f(x)=x^2+4$

Sum of squares

treat like dif of sq to start

$(x+2)(x-2)=f(x)$

but since the last terms mult to -4, we need another neg to get $+4$. If we put i on when you mult you get $-4i^2=4$

$(x+2i)(x-2i)=f(x)$