Pre-calculus: Problem Set 15 Operations with complex numbers, Polynomial long division, Zeroes of polynomials, Graphing rational functions

Simplify. 1. $\left(5+\sqrt{-4}\right)\left(4-\sqrt{-9}\right)$ 2. $\dfrac{i}{2-4i}$

Divide. 3. $\dfrac{4x^4-9x^3-8x^2-2x-7}{x-3}$ 4. $\left(4x^3-3x+5\right)\div\left(2x-3\right)$

Find the zeroes of P(x) given the indicated zero.

5. $P(x)=2x^3-9x^2-2x+30$ $\dfrac{5}{2}$ is one zero

6. $P(x)=x^3+3x^2+x+3$ i is one zero

Use $\boldsymbol{f(x)=\dfrac{x^2+x-12}{x^2-8x+15}}$ to answer 7 – 11.

7. Find the domain of f(x).
8. Find any vertical asymptotes.
9. Find any horizontal asymptotes.
10. Identify the x- and y- intercepts.
11. Sketch a graph.

Solutions to Odd Problems:

1. See next page for #3 and #5.

$\left(5+\sqrt{-4}\right)\left(4-\sqrt{-9}\right)$

$(5+2i)(4-3i)$

$20-15i+8i-6i^2$

$26-7i$

7.

$x^2-8x+15\neq 0$

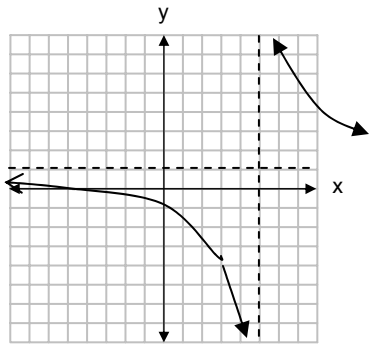
$(x-3)(x-5)\neq 0$

$x\neq 3,\quad x\neq 5$

$D:(-\infty,3)\cup(3,5)\cup(5,\infty)$

9. y = 1

11.



Answers to Even Problems:

2. $-\dfrac{1}{5}+\dfrac{1}{10}i$ 4. $2x^2+3x+3+\dfrac{14}{2x-3}$ 6. x = -*i*, -3 8. x = 5

10. $\left(0,\dfrac{-4}{5}\right),(-4,0)$

3.

$$
\begin{array}{r}
4x^3+3x^2+x+1 \\
x-3\overline{\big)\,4x^4-9x^3-8x^2-2x-7} \\
\underline{4x^4-12x^3} \\
3x^3-8x^2 \\
\underline{3x^3-9x^2} \\
x^2-2x \\
\underline{x^2-3x} \\
x-7 \\
\underline{x-3} \\
-4
\end{array}
$$

$$4x^3+3x^2+x+1-\frac{4}{x-3}$$

5.

$$
\begin{array}{r}
2x^2-4x-12 \\
x-\tfrac{5}{2}\overline{\big)\,2x^3-9x^2-2x+30} \\
\underline{2x^3-5x^2} \\
-4x^2-2x \\
\underline{-4x^2+10x} \\
-12x+30 \\
\underline{-12x+30}
\end{array}
$$

$$P(x)=(x-\tfrac{5}{2})(2x^2-4x-12)$$

$$0=(2x-5)(x^2-2x-6)$$

$$x=\tfrac{5}{2},\quad 1\pm\sqrt{7}$$

$$x=1\pm\sqrt{7}$$