Precalculus Unit 2 Homework—Real Zeros of Polynomials

In exercises 1-4, write each sum or difference in the standard form $a+bi$.

ODDS

1. $(2-3i)+(6+5i)$ $8+2i$
2. $(2-3i)+(3-4i)$ $5-7i$
3. $(7-3i)+(6-i)$ $13-4i$
4. $(2+i)-(9i-3)$ $5-8i$

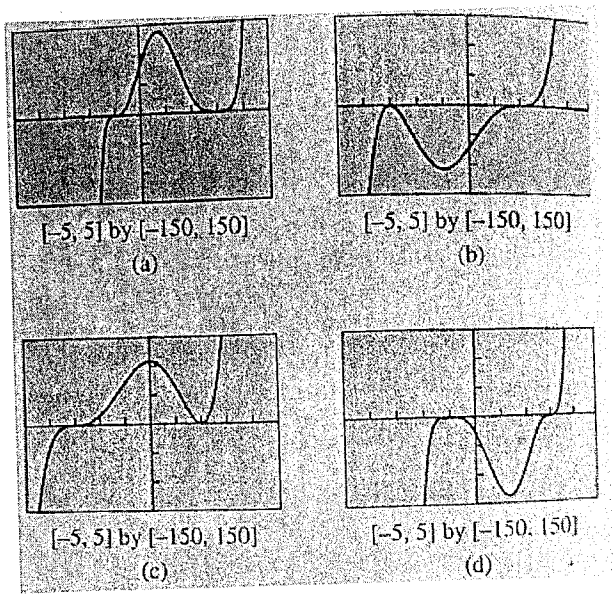
In exercises 5-10, write the expression in standard form.

ODDS

5. $\frac{1}{2+i}$ $\frac{2-i}{5} = \frac{2}{5} - \frac{1}{5}i$
6. $\frac{i}{2-i}$ $-\frac{1}{5} + \frac{2}{5}i$
7. $\frac{2+i}{2-i}$ $\frac{3}{5} + \frac{4}{5}i$
8. $\frac{2+i}{3i}$ $\frac{1}{3} - \frac{2}{3}i$
9. $\frac{(2-i)(1+2i)}{5+2i}$ $\frac{26}{29} + \frac{7}{29}i$
10. $\frac{(1-i)(2-i)}{1-2i}$ $\frac{7}{5} - \frac{1}{5}i$

In exercises 11-14, match the polynomial function graph to the given zeros and multiplicities.

all



11. –3 (multiplicity 2), 2 (multiplicity 3)
b
12. –3 (multiplicity 3), 2 (multiplicity 2)
c
13. –1 (multiplicity 4), 3 (multiplicity 3)
d
14. –1 (multiplicity 3), 3 (multiplicity 4)
a

all In exercises 15-18, find all of the zeros and write a linear factorization of the function.

15. $f(x) = x^3 + 4x - 5$ zeros: $1, \frac{-1 \pm i\sqrt{19}}{2}$

16. $f(x) = x^3 - 10x^2 + 44x - 69$ zeros: $3, \frac{7 \pm i\sqrt{43}}{2}$

17. $f(x) = x^4 + x^3 + 5x^2 - x - 6$ zeros: $\pm 1, \frac{-1 \pm i\sqrt{23}}{2}$

18. $f(x) = 3x^4 + 8x^3 + 6x^2 + 3x - 2$ zeros: $-2, \frac{1}{3}, \frac{-1 \pm i\sqrt{3}}{2}$

see below for linear factorization

CDDS In exercises 19-24, write the function as a product of irreducible quadratic factors all with real coefficients. Use the given x-intercept to help you factor.

19. $f(x) = x^3 - x^2 - x - 2;\ x = 2$ $(x-2)(x^2+x+1)$

20. $f(x) = x^3 - x^2 + x - 6;\ x = 2$ $(x-2)(x^2+x+3)$

21. $f(x) = 2x^3 - x^2 + 2x - 3;\ x = 1$ $(x-1)(2x^2+x+3)$

22. $f(x) = 3x^3 - 2x^2 + x - 2;\ x = 1$ $(x-1)(3x^2+x+2)$

23. $f(x) = x^4 + 3x^3 - 3x^2 + 3x - 4;\ x = 1$ $(x-1)(x+4)(x^2+1)$

24. $f(x) = x^4 - 2x^3 + x^2 - 8x - 12;\ x = -1$ $(x-3)(x+1)(x^2+4)$

15. $f(x) = (x-1)(x^2+x+5) = (x-1)\left(x - \left(-\frac{1}{2} - \frac{i\sqrt{19}}{2}\right)\right)\left(x - \left(-\frac{1}{2} + \frac{i\sqrt{19}}{2}\right)\right)$

16. $f(x) = (x-3)(x^2-7x+23) = (x-3)\left(x - \left(\frac{7}{2} + \frac{i\sqrt{43}}{2}\right)\right)\left(x - \left(\frac{7}{2} - \frac{i\sqrt{43}}{2}\right)\right)$

17 $f(x) = (x-1)(x+1)(x^2+x+6) = (x-1)(x+1)\left(x - \left(-\frac{1}{2} + \frac{i\sqrt{23}}{2}\right)\right)\left(x - \left(-\frac{1}{2} - \frac{i\sqrt{23}}{2}\right)\right)$

18. $f(x) = (x+2)(3x-1)\left(x - \left(-\frac{1}{2} + \frac{i\sqrt{3}}{2}\right)\right)\left(x - \left(-\frac{1}{2} - \frac{i\sqrt{3}}{2}\right)\right)$