Finding Zeros of Polynomial Functions

1. List all possible rational zeros of the function.

a. $f(x) = 2x^3 + 5x^2 - 8x - 10$

b. $g(x) = 4x^3 + x^2 + 16x + 4$

2. Find all of the zeros of each function using the rational root theorem or by factoring.

a. $h(x) = x^3 + 3x^2 - 25x + 21$

b. $y = 81x^4 - 1$

c. $f(x) = x^4 - x^3 - x^2 - x - 2$

d. $f(x) = x^4 + x^3 - 8x - 8$

e. $f(x) = x^3 + 5x^2 - 4x - 20$

f. $y = x^4 + x^3 + 2x^2 + 4x - 8$

g. $h(x) = 15x^4 - x^2 - 2$

3. Write a polynomial function, $f(x)$, of least degree that has integral coefficients and the given zeros.

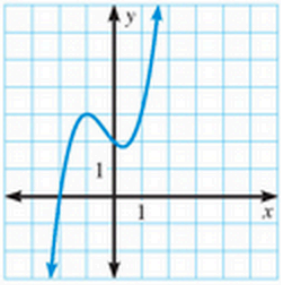
a) -2, 1, 3 b) $-1,\ 2,\ -3i$ c) $-\frac{2}{3},\ \sqrt{5}$ d) $3(\text{mult. of } 2),\ 1+i$

4. Two zeros of $f(x) = x^3 - 6x^2 - 16x + 96$ are 4 and -4. *Explain* why the third zero must also be a real number.

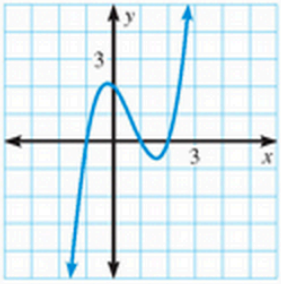
5. Find all *real* zeros of the function. Then match each function with its graph.

a) $f(x) = x^3 - 2x^2 - x + 2$ b) $f(x) = x^3 - 3x^2 + 2$ c) $h(x) = x^3 + x^2 - x + 2$

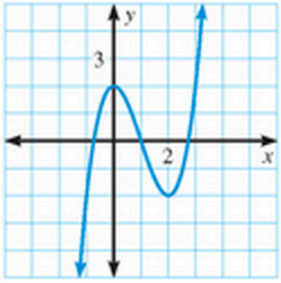
A.



B.



C.



ANSWERS

1.

a. $\pm 1,\ \pm 2,\ \pm 5,\ \pm 10,\ \pm \frac{1}{2},\ \pm \frac{5}{2}$

b. $\pm 1,\ \pm 2,\ \pm 4,\ \pm \frac{1}{2},\ \pm \frac{1}{4}$

2.

a. 1, 3, -7

b. $\pm \frac{1}{3},\ \pm \frac{i}{3}$

c. -1, 2, $\pm i$

d. -1, 2, $-1 \pm i\sqrt{3}$

e. -5, 2, -2

f. -2, 1, $\pm 2i$

g. $\pm \frac{i\sqrt{3}}{3},\ \pm \frac{\sqrt{10}}{5}$

3.

a. $f(x) = x^3 - 2x^2 - 5x + 6$

b. $f(x) = x^4 - x^3 + 7x^2 - 9x - 18$

c. $f(x) = 3x^3 + 2x^2 - 15x - 10$

d. $f(x) = x^4 - 8x^3 + 23x^2 - 30x + 18$

4. The polynomial has a degree of three and thus has three zeros. If two are real there is one left over. The third zero must also be real because imaginary zeros always come in pairs.

5.

a. -1, 1, 2; B

b. 1, $1 \pm \sqrt{3}$; C

c. -2; A