Ex. write a polynomial function of minimum degree in standard form with real coefficients whose zeros and their multiplicities include those listed.

13. 1 (multiplicity 2), −2 (multiplicity 3) $(x+2)^3$

$(x-1)(x-1)(x+2)(x+2)(x+2)$

$(1x^2-2x+1)(1x^3+3x^2\cdot 2^1+3x^1\cdot 2^2+1\cdot 2^3)$

$(x^2-2x+1)(x^3+6x^2+12x+8)$

In Exercises 21–26, state how many complex and real zeros the function has.

25. $f(x) = x^4 - 5x^3 + x^2 - 3x + 6$

4 complex zeros

list possible rat. zeros

$\frac{P}{Q}: \frac{\pm 1 \pm 2 \pm 3 \pm 6}{\pm 1}$

$\frac{P}{Q} = \{\pm 1, \pm 2, \pm 3, \pm 6\}$

$$\begin{array}{r|rrrrr} 1 & 1 & -5 & 1 & -3 & 6 \\ & & 1 & -4 & -3 & -6 \\ \hline & 1 & -4 & -3 & -6 & \boxed{0} \end{array}$$

$\boxed{\text{2 real solns}}$

Finding Complex Zeros

The complex number $z = 1 - 2i$ is a zero of $f(x) = 4x^4 + 17x^2 + 14x + 65$. Find the remaining zeros of $f(x)$, and write it in its linear factorization.

$$\begin{array}{c|ccccc} 1-2i & 4 & 0 & 17 & 14 & 65 \\ & & 4-8i & -12-16i & -27-26i & -65 \\ \hline 1+2i & 4 & 4-8i & 5-16i & -13-26i & \boxed{0} \\ & & 4+8i & 8+16i & 13+26i & \\ \hline & 4 & 8 & 13 & \boxed{0} & \end{array}$$

$(x-1+2i)(x+1-2i)(4x^2+8x+13)$

$(x-1+2i)(x-1-2i)\cancel{(4x\quad)(4x\quad)}$

$$x = \frac{-8 \pm \sqrt{64-4(4)(13)}}{8}$$

$$x = \frac{-8 \pm \sqrt{64-208}}{8}$$

$$x = \frac{-8 \pm \sqrt{-144}}{8}$$

$$x = \frac{-8 \pm 12i}{8}$$

$$x = -1 \pm \frac{3}{2}i$$

$x = -1 + \frac{3}{2}i \quad x = -1 - \frac{3}{2}i$

$(x-1+2i)(x-1-2i)\left(x+1-\frac{3}{2}i\right)\left(x+1+\frac{3}{2}i\right)$

2.2 Power Functions with Modeling

Objective: Describe and create power functions

Power function:

power

FORM: $f(x)=k\cdot x^{a}$

constant of variation

(constant of proportion)

Common Power Functions:

	Power?	Constant of variation
Circumference $C=\pi d$ or $C=2\pi r$	1 / 1	π / 2π
Area of a circle $A=\pi r^2$	2	π
~~Force of gravity~~		
~~Boyle's Law~~		

Practice Page 196 1-10

In Exercises 1–10, determine whether the function is a power function, given that c, g, k, and π represent constants. For those that are power functions, state the power and constant of variation.

1. $f(x) = -\frac{1}{2}x^5$

2. $f(x) = 9x^{5/3}$

3. $f(x) = 3 \cdot 2^x$

4. $f(x) = 13$

5. $E(m) = mc^2$

6. $KE(v) = \frac{1}{2}kv^5$

7. $d = \frac{1}{2}gt^2$

8. $V = \frac{4}{3}\pi r^3$

9. $I = \frac{k}{d^2}$

10. $F(a) = m \cdot a$

Positive powers are statements of ____Direct variation____.

Negative powers are statements of ___Inverse variation____.

Write the statement as a power function. Use 'k' for the constant of variation if one is not given.

1. The area of a rectangle with a fixed width $\boxed{\text{varies directly}}$ with its length.

$A = k\ell$

2. The length of a rectangle ~~with an area 50ft²~~ varies inversely with it's height.

$$\ell = \frac{k}{h}$$