

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) $(x+2)^3$

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

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

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

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

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

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

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

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.

$$\begin{array}{r}
 \underline{1-2i} \mid 4 \quad 0 \quad 17 \quad 14 \quad 65 \\
 \quad \quad 4-8i \quad -12-6i \quad -27-26i \quad -65 \\
 \hline
 \underline{1+2i} \mid 4 \quad 4-8i \quad 5-16i \quad -13-26i \quad \boxed{0} \\
 \quad \quad 4+8i \quad 8+16i \quad 13+26i \\
 \hline
 \quad \quad 4 \quad 8 \quad 13 \quad \boxed{0}
 \end{array}$$

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

$$(x-1+2i)(x-1-2i) \left(\cancel{4x^2} \right) \left(\cancel{4x^2} \right)$$

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

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

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

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

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

$$x = -1 + \frac{3}{2}i \quad \left. \vphantom{x = -1 + \frac{3}{2}i} \right\} x = -1 - \frac{3}{2}i$$

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

2.2 Power Functions with Modeling

Objective: Describe and create power functions

Power function:

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

power

*constant of variation
(constant of proportion)*

Common Power Functions:

Power? Constant of variation

Circumference

$$C = \pi d \text{ or } C = 2\pi r$$

Area of a circle

$$A = \pi r^2$$

~~Force of gravity~~

~~Boyle's Law~~

1 1	π 2π
2	π

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. $E(m) = mc^2$

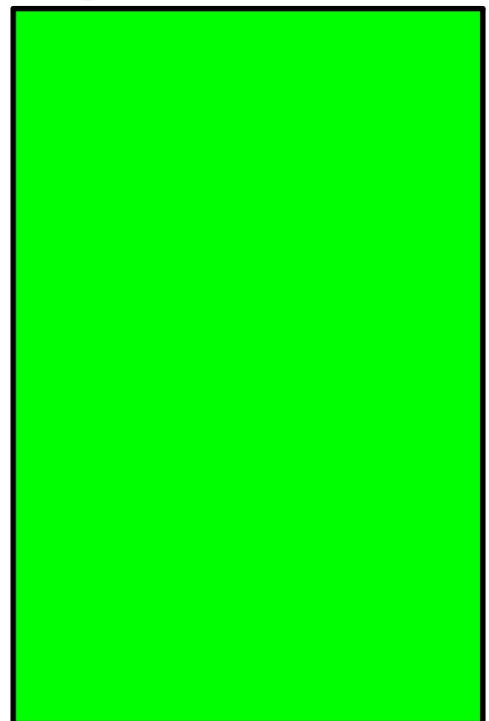
6. $KE(v) = \frac{1}{2}kv^5$

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 varies directly with its length. $A = kQ$

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

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