

DETERMINE WHICH FUNCTIONS ARE POLYNOMIALS.
FIND THE DEGREE OF POLYNOMIAL FUNCTIONS

1. $f(x) = 1 - x^{-1}$ NOT polynomials

2. $g(x) = x(x-2)$ polynomial degree 2

3. $h(x) = \frac{\sqrt{x}}{x^{\frac{1}{2}}}(\sqrt{x}-1)$ NOT polynomial.

FIND POLYNOMIAL FUNCTIONS WHOSE REAL ZEROS AND DEGREE IS GIVEN

ZEROS $-2, 2, 3$ degree 3

$$\begin{aligned} f(x) &= (x+2)(x-2)(x-3) & \text{or } f(x) &= 2(x+2)(x-2)(x-3) \\ &= (x^2-4)(x-3) & &= 2(x^3-3x^2-4x+12) \\ &= \underline{x^3-3x^2-4x+12} & &= 2x^3-6x^2-8x+24 \end{aligned}$$

ZEROS 1 multiplicity 3; 2 multiplicity 2 degree 5

$$\begin{aligned} f(x) &= (x-1)^3(x-2)^2 \\ &= (x^3-3x^2+3x-1)(x^2-4x+4) \\ &= x^5-4x^4+4x^3-3x^4+12x^3-12x^2+3x^3-12x^2+12x-x^2+4x-4 \\ &= x^5-7x^4+18x^3-25x^2+16x-4 \end{aligned}$$

$$f(x) = -2x^2(x^2-2)$$

LIST EACH ZERO AND ITS MULTIPLICITY

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

$$-2x^2=0 \Rightarrow x=0 \text{ multiplicity } 2$$

$$x^2-2=0 \Rightarrow x=2 \Rightarrow x=\sqrt{2} \quad x=-\sqrt{2} \text{ mult. } 1$$

DETERMINE IF THE GRAPH CROSSES OR TOUCHES X-AXIS

$x=0$ touches

$x=\sqrt{2}$ crosses

$x=-\sqrt{2}$ crosses

DETERMINE MAXIMUM NUMBERS OF TURNING POINTS

degree 4 $\Rightarrow 4-1=3$ turning point

DETERMINE THE END BEHAVIOR.

Like x^2

