

2.1 Polynomial Functions

For n , a non-negative integer

with $a_0, a_1, a_2 \dots a_n$ real numbers,
then:

$$f(x) = a_n x^n + a_{n-1} x^{n-1} + \dots + a_0$$

is a polynomial function of degree n , and L.C. of a_n .

| <u>Name</u> | <u>Form</u> | <u>Degree</u> |
|-------------------|------------------------|---------------|
| Zero function | $f(x) = 0$ | undefined |
| constant function | $f(x) = a x^0$ | Zero |
| Linear function | $f(x) = ax + b$ | 1 |
| Quadratic " | $f(x) = ax^2 + bx + c$ | 2 |

Ex Polynomial? yes or no $\sqrt{x} = x^{1/2}$

a) $f(x) = 4x^3 - 5x - \frac{1}{2}$
yes

b) $h(x) = \frac{1}{\sqrt{ax^2 + 16x^2}}$

no

c) $g(x) = 6x^{-4} + 7$
no

d) $f(x) = 14x - 2x^4$
yes

Quadratic Functions

Standard form: $y = ax^2 + bx + c$

graphing/vertex form:

$$y = a(x-h)^2 + k$$

vertex: (h, k)

axis of symmetry $x = h$

Ex: Write in graphing form.

$$y = -2x^2 + 6x + 1$$

$$y = -2(x-1.5)^2 + 5.5$$

$$v: (1.5, 5.5)$$

Ex: $y = x^2 + 4x - 7$

$$y = (x+2)^2 - 11$$

Ex Write the equation of the parabola w/ vertex $(-2, -3)$ and point $(-4, -5)$.

$$y = a(x-h)^2 + k$$

$$-5 = a(-4+2)^2 - 3$$

$$-5 = a(-2)^2 - 3$$

$$-5 = 4a - 3$$

$$\frac{-2}{4} = \frac{4a}{4}$$

$$-\frac{1}{2} = a$$

$$y = -\frac{1}{2}(x+2)^2 - 3$$

Ex Formula for vertical free fall.

$$h = -16t^2 + \underbrace{v_0}_{\substack{\uparrow \\ \text{initial} \\ \text{velocity}}}t + \underbrace{h_0}_{\substack{\uparrow \\ \text{initial} \\ \text{height}}}$$

Write an equation to model the path of a ball if a baseball player throws it w/ an initial velocity of 85 ^{v_0} ft/sec from a height of 5.5 _{h_0} ft.

$$h = -16t^2 + 85t + 5.5$$