# Monomial and Polynomial

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## Monomial

Functions of the form:

$$a \cdot x^k$$

are monomials.

- *a* is any real number, it is the coefficient.
- *k* is a positive integer, it is the degree of the monomial

## Polynomial

Monomials added up together are polynomials

$$a + b \cdot x + c \cdot x^2 + d \cdot x^3 + e \cdot x^4$$

The coefficients $a, b, c, d, e$ above could be positive or negative.

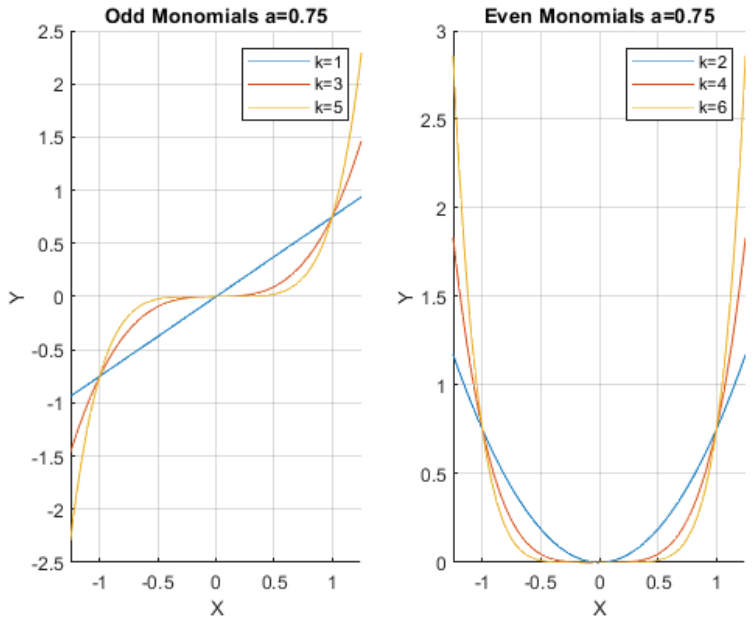
- **Degree of Polynomial**: We say that this polynomial has degree of 4. You find the largest degree monomial in the polynomial, and its degree is the degree of the whole polynomial.

# Graphical Monomial Examples

Take a look at the function below, matlab makes it very easy to plot functions. You can see that when we shift the coefficient for the monomial, it rescales the function but does not change the ordinality.

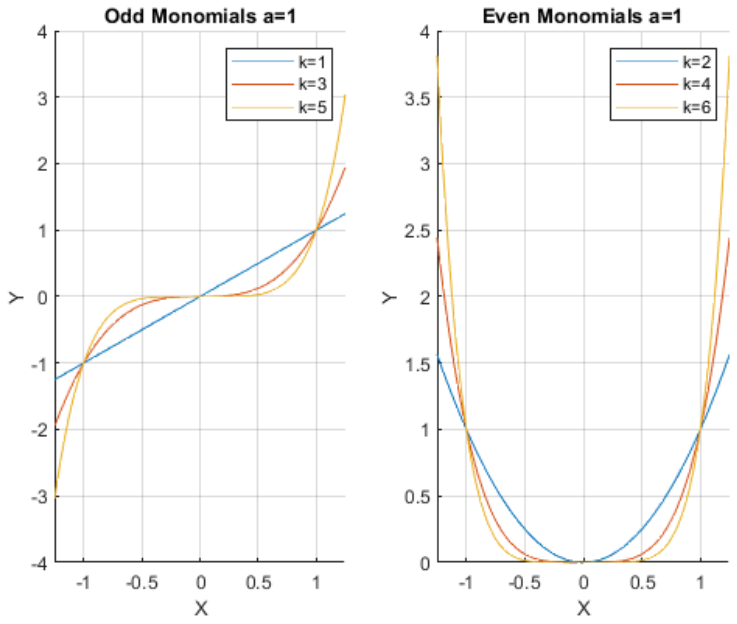
## Monomial when a = 0.75

```
clear all;
a = 0.75;
monomial_graph(a)
```



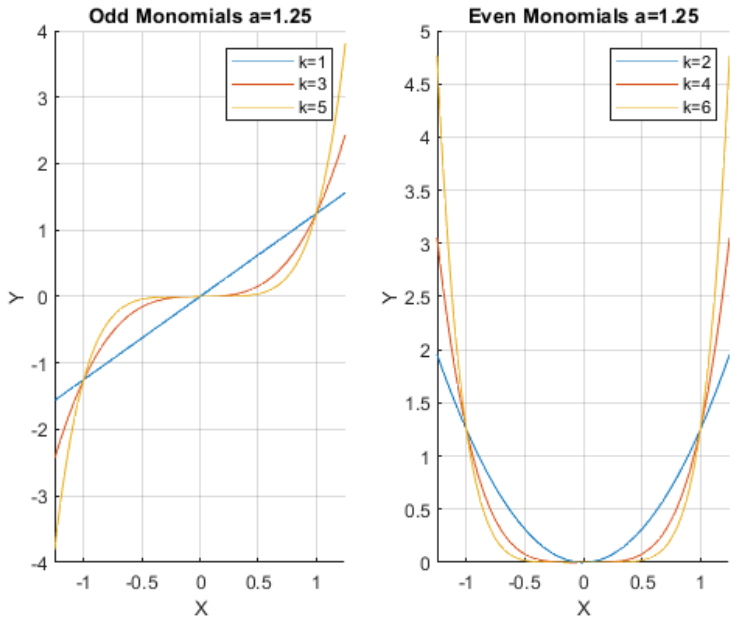

## Monomial when a = 1

```
a = 1;
monomial_graph(a)
```




## Monomial when a = 1.25

```
a = 1.25;
monomial_graph(a)
```




## Mononomials Function

When we program, we can write functions, which have parameters

```
function monomial_graph(a)

% Define a symbolic monomial
syms x k
f(x, k) = a*x^k;

% Graph equation
close all;
figure();

%Subplot 1
subplot(1,2,1)
% Create minimum x and maximum x point where to draw the graph
x_lower_bd = -1.25;
x_upper_bd = +1.25;
% keep all figures, do not drop previous
hold on;
% Draw the function
ak1 = fplot(@(x) f(x, 1), [x_lower_bd, x_upper_bd]);
ak3 = fplot(@(x) f(x, 3), [x_lower_bd, x_upper_bd]);
ak5 = fplot(@(x) f(x, 5), [x_lower_bd, x_upper_bd]);
% Label
xlabel('X');
ylabel('Y');
xlim([x_lower_bd, x_upper_bd])
title(['Odd Monomials a=',num2str(a)])
legend('k=1','k=3', 'k=5');
grid on
```

```
% Subplot 2
subplot(1,2,2)
% Create minimum x and maximum x point where to draw the graph
x_lower_bd = -1.25;
x_upper_bd = +1.25;
% keep all figures, do not drop previous
hold on;
% Draw the function
ak2 = fplot(@(x) f(x, 2), [x_lower_bd, x_upper_bd]);
ak4 = fplot(@(x) f(x, 4), [x_lower_bd, x_upper_bd]);
ak6 = fplot(@(x) f(x, 6), [x_lower_bd, x_upper_bd]);
% Label
xlabel('X');
ylabel('Y');
xlim([x_lower_bd, x_upper_bd])
title(['Even Monomials a=', num2str(a)])
legend('k=2','k=4', 'k=6');
grid on
end
```