
Table of Contents

| | |
|--|---|
| LECTURE 27 Nov | 1 |
| Dealing with missing data | 1 |
| Testing Equality with Missing Values | 1 |
| Removing missing values | 1 |
| Fill missing NaN values with Interpolation | 3 |

LECTURE 27 Nov

%-----

Dealing with missing data

Testing Equality with Missing Values

```
%determine if A1 A2 A3 are equal.
A1 = [1 NaN NaN];
A2 = [1 NaN NaN];
A3 = [1 NaN NaN];
%Make sure that the NaN values are treated as equal.
%Assign the result to tf.
%Compare the vectors for equality.
tf1 = isequal(A1,A2,A3)
%isequal does not treat NaN values as equal to each other.
%isequal does not consider data type when it tests for equality.

A1 = [1 NaN NaN];
A2 = [1 NaN NaN];
A3 = [1 NaN NaN];
%Compare the vectors for equality.
tf2 = isequaln(A1,A2,A3)
% isequaln treats the NaN values as equal to each other.
% isequaln does not consider data type when it tests for equality.

tf1 =

    0

tf2 =

    1
```

Removing missing values

consider

```

X = rand(10, 10);
X(X < 0.1) = NaN;
disp(X);
% compute the mean
mean(X)
% delete rows which have NaN
X(any(isnan(X), 2), :) = [];
% compute the mean
mean(X)

% consider
X = rand(10, 10);
X(X < 0.1) = NaN;
disp(X);
% remove rows which have exactly one NaN in a row
X(sum(isnan(X), 2) == 1, :) = [];

```

Columns 1 through 7

| | | | | | | |
|--------|--------|--------|--------|--------|--------|--------|
| 0.8507 | 0.6126 | 0.7386 | 0.7690 | 0.5523 | 0.1465 | 0.1239 |
| 0.5606 | 0.9900 | 0.5860 | 0.5814 | 0.6299 | 0.1891 | 0.4904 |
| 0.9296 | 0.5277 | 0.2467 | 0.9283 | NaN | NaN | 0.8530 |
| 0.6967 | 0.4795 | 0.6664 | 0.5801 | 0.6147 | 0.6352 | 0.8739 |
| 0.5828 | 0.8013 | NaN | NaN | 0.3624 | 0.2819 | 0.2703 |
| 0.8154 | 0.2278 | 0.6260 | 0.1209 | NaN | 0.5386 | 0.2085 |
| 0.8790 | 0.4981 | 0.6609 | 0.8627 | 0.4896 | 0.6952 | 0.5650 |
| 0.9889 | 0.9009 | 0.7298 | 0.4843 | 0.1925 | 0.4991 | 0.6403 |
| NaN | 0.5747 | 0.8908 | 0.8449 | 0.1231 | 0.5358 | 0.4170 |
| 0.8654 | 0.8452 | 0.9823 | 0.2094 | 0.2055 | 0.4452 | 0.2060 |

Columns 8 through 10

| | | |
|--------|--------|--------|
| 0.9479 | 0.7378 | 0.1339 |
| NaN | NaN | NaN |
| 0.1057 | 0.8604 | 0.9391 |
| 0.1420 | 0.9344 | 0.3013 |
| 0.1665 | 0.9844 | 0.2955 |
| 0.6210 | 0.8589 | 0.3329 |
| 0.5737 | 0.7856 | 0.4671 |
| NaN | 0.5134 | 0.6482 |
| 0.9312 | 0.1776 | NaN |
| 0.7287 | 0.3986 | 0.8422 |

ans =

Columns 1 through 7

| | | | | | | |
|-----|--------|-----|-----|-----|-----|--------|
| NaN | 0.6458 | NaN | NaN | NaN | NaN | 0.4648 |
|-----|--------|-----|-----|-----|-----|--------|

Columns 8 through 10

| | | |
|-----|-----|-----|
| NaN | NaN | NaN |
|-----|-----|-----|

`ans =`

Columns 1 through 7

| | | | | | | |
|--------|--------|--------|--------|--------|--------|--------|
| 0.8230 | 0.6088 | 0.7621 | 0.6053 | 0.4655 | 0.4805 | 0.4422 |
|--------|--------|--------|--------|--------|--------|--------|

Columns 8 through 10

| | | |
|--------|--------|--------|
| 0.5981 | 0.7141 | 0.4361 |
|--------|--------|--------|

Columns 1 through 7

| | | | | | | |
|--------|--------|--------|--------|--------|--------|--------|
| 0.5590 | 0.9884 | 0.1781 | 0.9121 | 0.8949 | 0.4561 | 0.6311 |
| 0.8541 | 0.5400 | 0.3596 | 0.1040 | NaN | 0.1017 | NaN |
| 0.3479 | 0.7069 | NaN | 0.7455 | 0.2425 | 0.9954 | NaN |
| 0.4460 | 0.9995 | 0.5219 | 0.7363 | NaN | 0.3321 | 0.7772 |
| NaN | 0.2878 | 0.3358 | 0.5619 | 0.4417 | 0.2973 | 0.9051 |
| 0.1771 | 0.4145 | 0.1757 | 0.1842 | NaN | NaN | 0.5338 |
| 0.6628 | 0.4648 | 0.2089 | 0.5972 | 0.8972 | 0.2982 | 0.1092 |
| 0.3308 | 0.7640 | 0.9052 | 0.2999 | 0.1967 | NaN | 0.8258 |
| 0.8985 | 0.8182 | 0.6754 | 0.1341 | NaN | 0.5054 | 0.3381 |
| 0.1182 | 0.1002 | 0.4685 | 0.2126 | 0.3074 | 0.7614 | 0.2940 |

Columns 8 through 10

| | | |
|--------|--------|--------|
| 0.7463 | 0.6925 | 0.5495 |
| NaN | 0.5567 | 0.4852 |
| NaN | 0.3965 | 0.8905 |
| 0.6679 | NaN | 0.7990 |
| 0.6035 | 0.7802 | 0.7343 |
| 0.5261 | 0.3376 | NaN |
| 0.7297 | 0.6079 | NaN |
| 0.7073 | 0.7413 | NaN |
| 0.7814 | 0.1048 | 0.7984 |
| 0.2880 | 0.1279 | 0.9430 |

Fill missing NaN values with Interpolation

```
x = [1 2 4 5 7 10 11 12 13 14];  
y = [10 1 12 NaN 16 31 10 6 NaN NaN];
```

```
figure  
plot(x,y)
```

```
xi=x(find(~isnan(y)))  
yi=y(find(~isnan(y)))  
result=interp1(xi,yi,x,'linear');
```

```
figure  
plot(xi,yi)
```

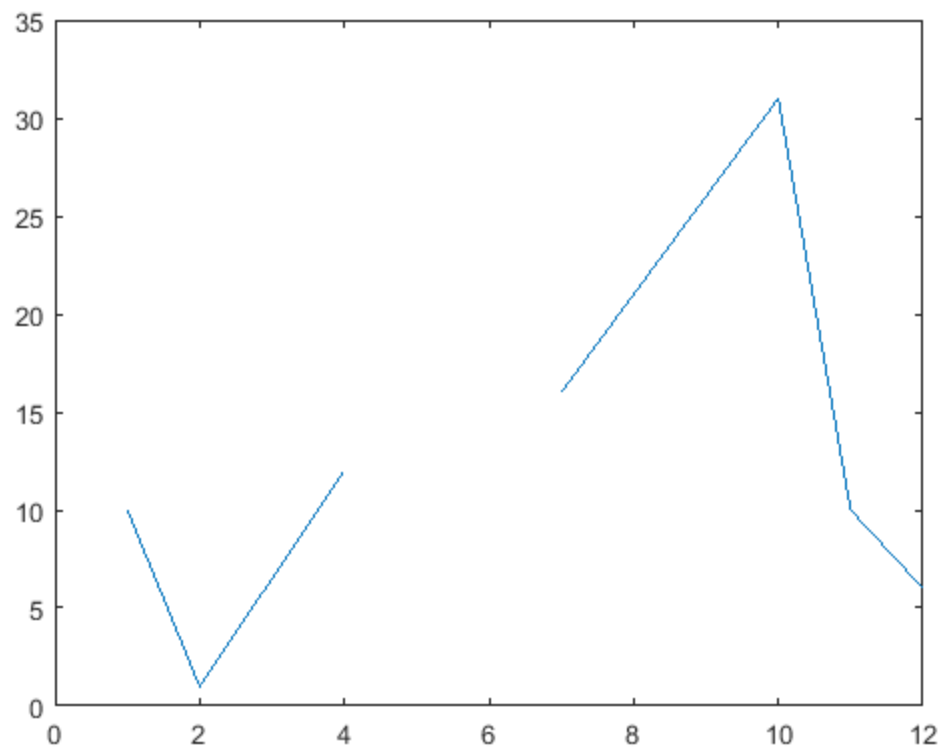
```
% you can also look
```

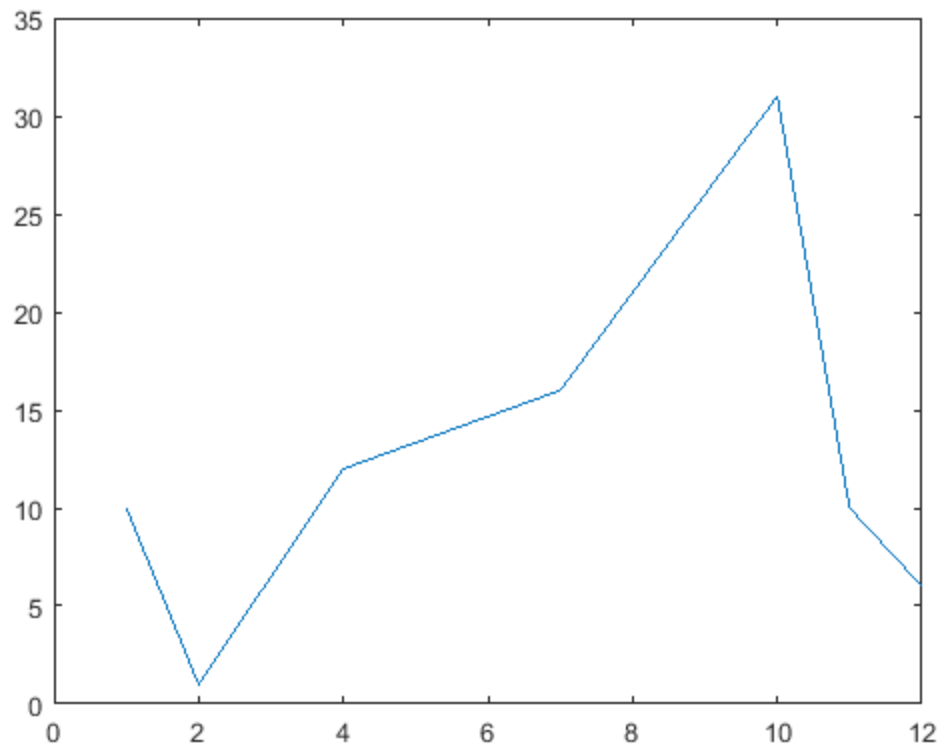
```
xi =
```

```
1    2    4    7   10   11   12
```

```
yi =
```

```
10    1   12   16   31   10    6
```





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