Decisions

The if Structure:

```plaintext
if condition
    statements
end
```

The if …else Structure:

```plaintext
if condition
    statements_1
else
    statement_2
end
```

The if …elseif Structure:

```plaintext
if condition_1
    statements_1
elseif condition_2
    statement_2
elseif condition_3
    statement_3
    ...
else
    statements_else
end
```

Logical Conditions:

Expression: \( value_1 \text{ relation } value_2 \)

~ (Not): \( \sim \text{ expression} \)

& (And): \( expression_1 \& expression_2 \)

| (Or): \( expression_1 \mid expression_2 \)

Relational Operations in MATLAB:

<table>
<thead>
<tr>
<th>Operators</th>
<th>Relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>==</td>
<td>Equal</td>
</tr>
<tr>
<td>~ =</td>
<td>Not equal</td>
</tr>
<tr>
<td>&lt;</td>
<td>Less than</td>
</tr>
<tr>
<td>&gt;</td>
<td>Greater than</td>
</tr>
<tr>
<td>&lt;=</td>
<td>Less than or equal to</td>
</tr>
<tr>
<td>&gt;=</td>
<td>Greater than or equal to</td>
</tr>
</tbody>
</table>
Examples:

```matlab
function c=xycompare(a,b)
    % compare the values of a and b
    if a > b
        c='x > y';
    elseif a<b
        c='x < y';
    else
        c='x = y';
    end
    return
end
```

```matlab
function c=xycompare1(a,b,e,f)
    % compare (a+b) vs. (e+f) and (a*b) vs. (e*f)
    if (a+b) > (e+f) & (a*b) > (e*f)
        c='sum >; product >';
    elseif (a+b) > (e+f) | (a*b) > (e*f)
        c='either sum > or product >';
    else
        c='all others';
    end
    return
end
```
Loops

The **for** Structure:

```
for index = start: step: finish
    statements
end
```

*step* can be either positive or negative. If the value of *step* is 1, *step* can be dropped. A **for** loop ends after *index* becomes larger than *finish* value.

Example:

```matlab
function nfac=nfactorial(n)
    a=1;
    for index=1:n
        a=a*index;
    end
    nfac=a;
    return
```

The **while** Structure:

```
while condition
    statements
end
```

The *statements* between **while** and **end** are repeated as long as the *condition* is true.

Example:

```matlab
function [mdn, rmn]=mndivision(m,n)
    mdn=0;
    while (m-n) > 0
        m=m-n;
        mdn=mdn+1;
    end
    rmn=m;
    return
```