CHE/CEN138

COMPUTER PROGRAMMING

LOOP CONTROL

References

1.Pratap, R. "Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers"Oxford University Press, 2010.

2.Hunt, B.R., Lipsman, L.R. and Rosemberg J. M. "A guide to MATLAB for Beginners and ExperiencedUsers"Cambridge Universty Press, 2001.

3.Kubat, C. "MATLAB Yapay Zeka ve Mühendislik Uygulamaları" İkinci Baskı, Pusula Yayıncılık, 2014McGraw Hill, International Edition 2012.

MATLAB STATEMENT TYPES (FOR LOOP)

For loop: Repeats a code segment a <u>fixed</u> number of times

```
for k= <vector>

    <statements>

end
```

The **<statements>** are executed repeatedly.
At each iteration, the variable **k** is assigned
a new value from **<vector>**.

EXAMPLE (FOR LOOP)

- **Task**: Generate the square of the first ten integers.

- **Solution:** Edit and execute the the following script M-file:
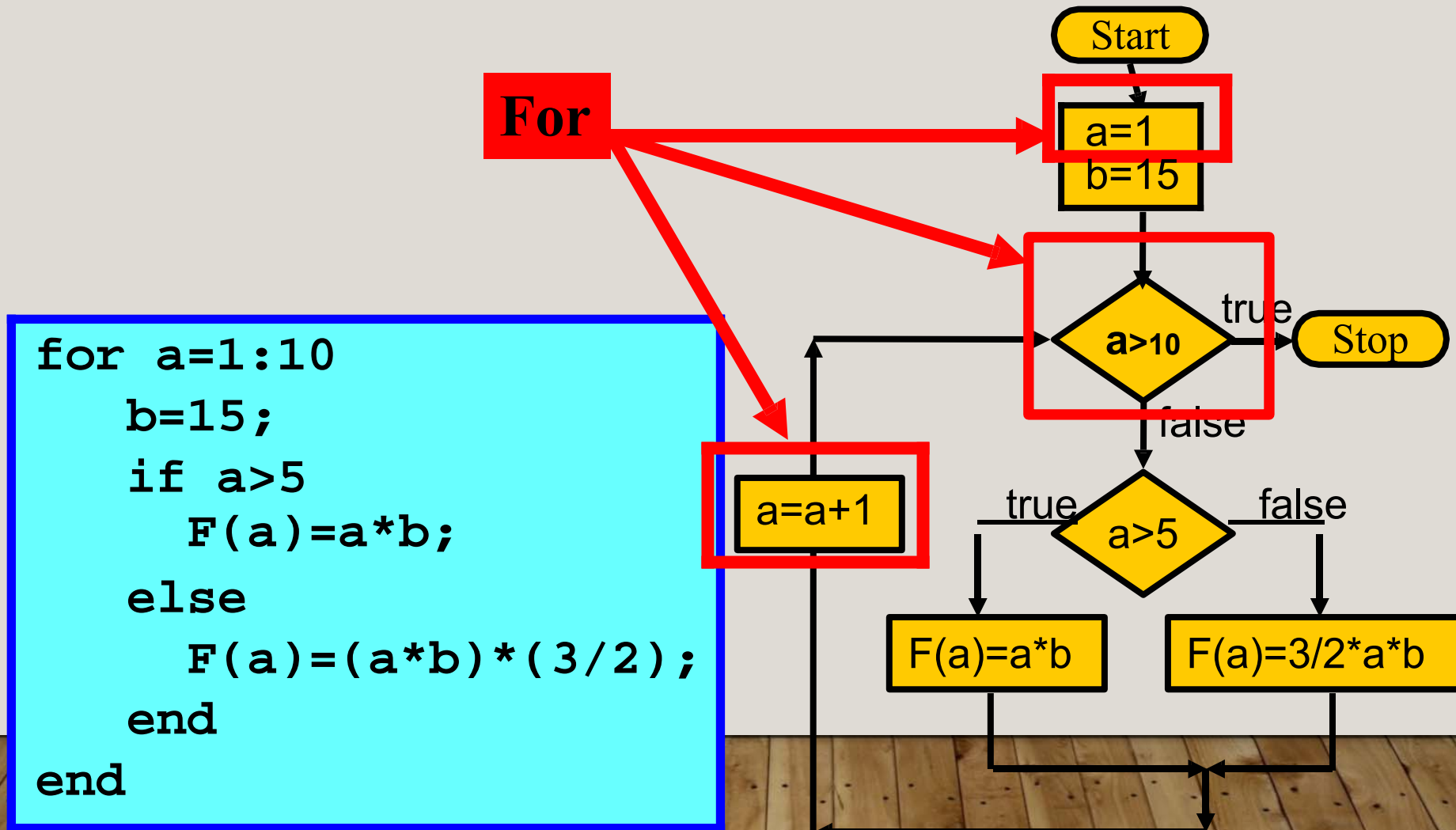
```
for m=1:10
    x(m)=m^2;
end;
```

The number of repetitions is controlled by the index variable **m**, which takes on the values **m** = 1 through **m** = 10 in intervals of 1.
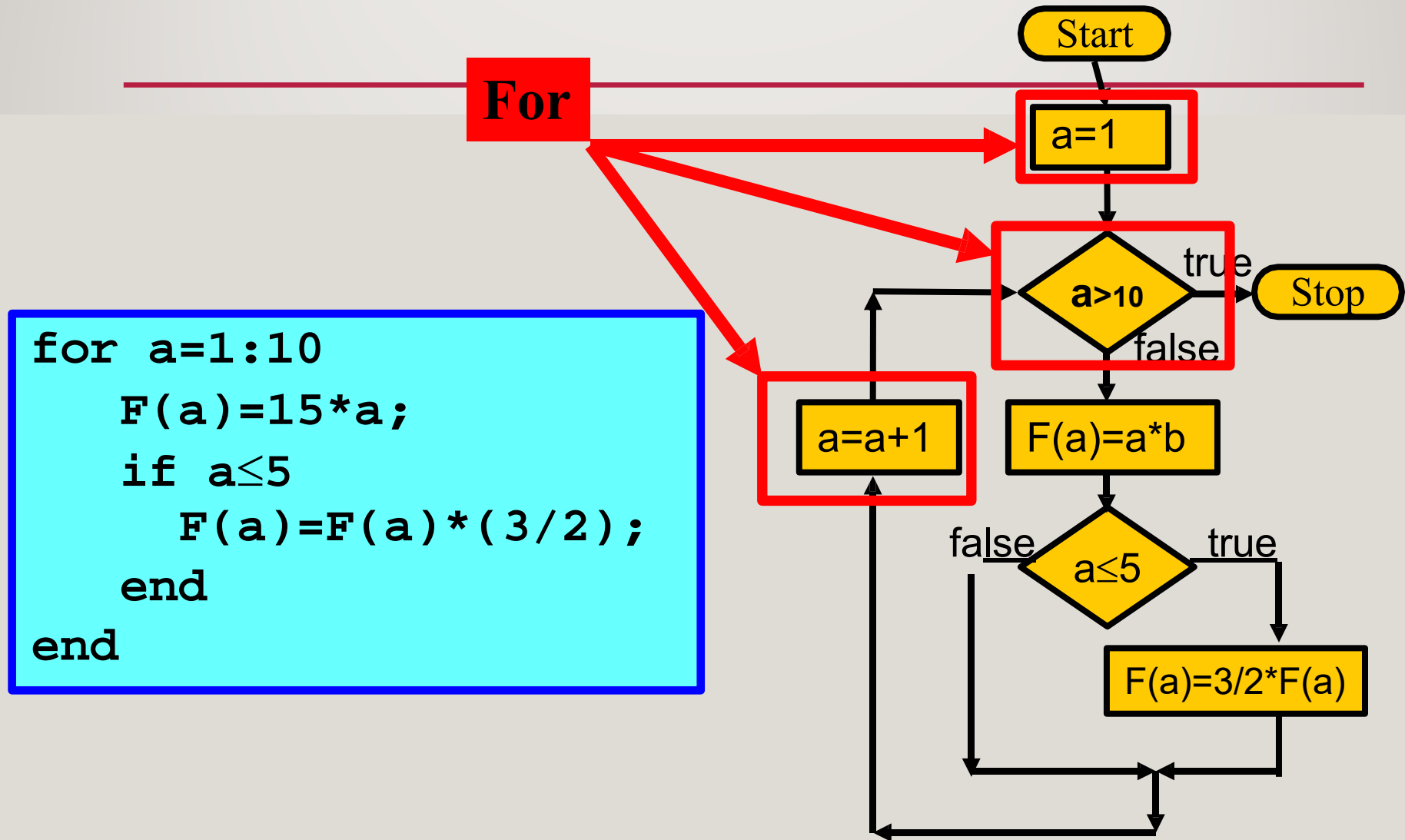
EXAMPLE (FOR LOOP)

Task: Find the value of function F(a, b) for integers $0 < a \leq 10$, and $b = 15$.

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```
for a=1:10
    b=15;
    if a>5
        F(a)=a*b;
    else
        F(a)=(a*b)*(3/2);
    end
end
```

For

Start

a=1
b=15

a>10 → true → Stop

false

a=a+1

a>5 → true → F(a)=a*b

a>5 → false → F(a)=3/2*a*b

EXAMPLE (FOR LOOP)

For

```
for a=1:10
    F(a)=15*a;
    if a≤5
        F(a)=F(a)*(3/2);
    end
end
```

Start

a=1

a>10 true → Stop

false

a=a+1

F(a)=a*b

a≤5 false / true

F(a)=3/2*F(a)

While loop: Repeats a code segment until a

condition fails to be satisfied.

```
while <condition>

    <statements>

end
```

The **<statements>** are executed repeatedly.
At each iteration, **<condition>** is reevaluated.
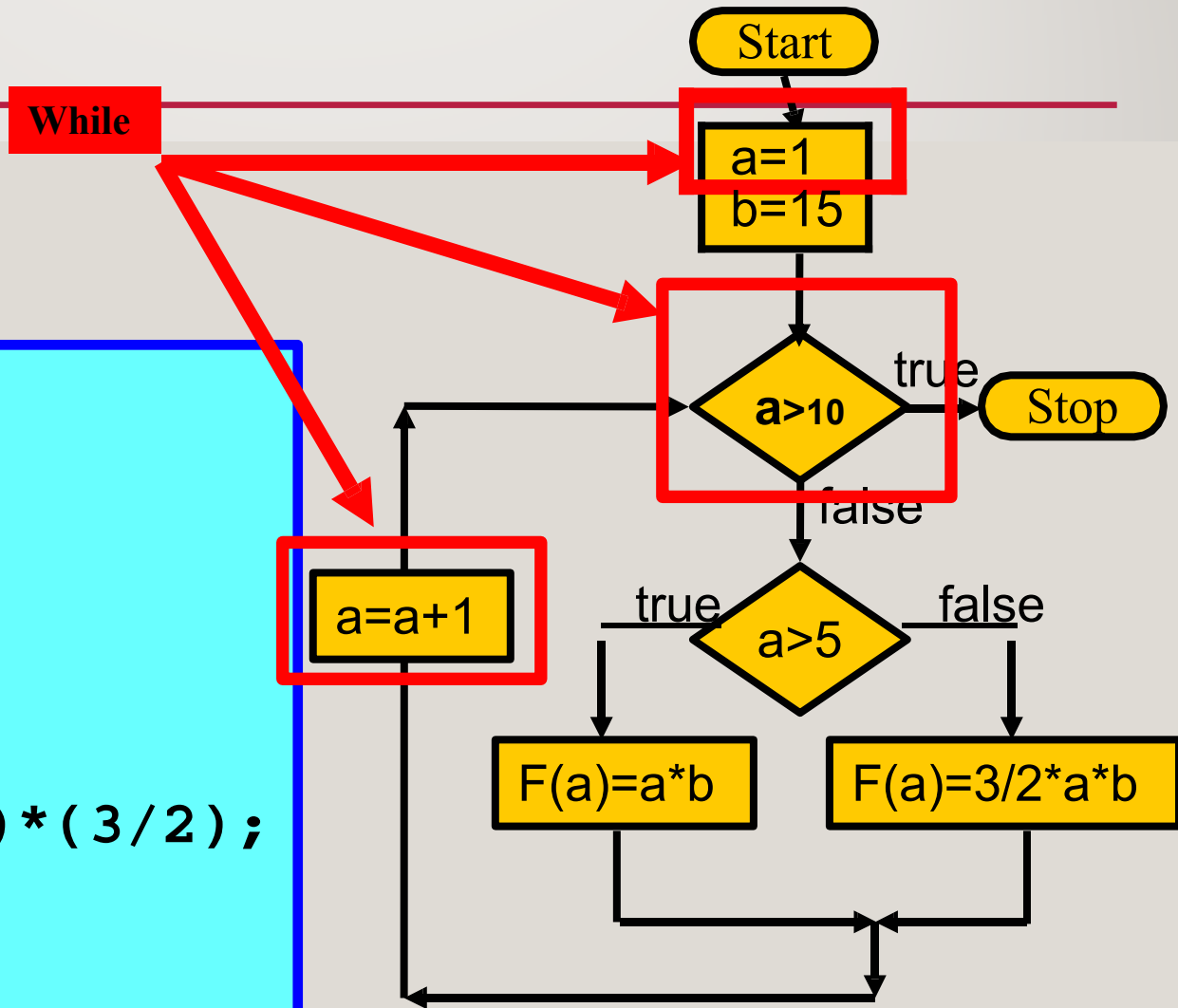The loop ends when the condition fails.

EXAMPLE (WHILE LOOP)

Task: Find the value of function F(a, b) for integers $0 < a \leq 10$, and $b = 15$.

$$F(a, b) = ab, \quad \text{if } a > 5$$
$$\frac{3}{2} ab \quad \text{otherwise.}$$

(Same as an earlier problem solved using a for loop)

EXAMPLE (WHİLE LOOP)

While

Start

a=1
b=15

a>10 — true → Stop

false

a>5 — true / false

true → F(a)=a*b

false → F(a)=3/2*a*b

a=a+1

```
a = 1;
while a ≤ 10
    b=15;
    if a>5
        F(a)=a*b;
    else
        F(a)=(a*b)*(3/2);
    end
    a=a+1;
end
```

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COMPARISON FOR/WHILE

```
for a=1:10
   b=15;
   if a>5
     F(a)=a*b;
   else
     F(a)=(a*b)*(3/2);
   end
end
```

```
a = 1;
while a ≤ 10
   b=15;
   if a>5
     F(a)=a*b;
   else
     F(a)=(a*b)*(3/2);
   end
   a=a+1;
end
```

COMPARISON FOR/WHILE

```
-   for m=1:4
      num=1/(m+1)
    end
```

```
-   m=1;
      while m<=4
      num=1/(m+1)
      m=m+1;
    end
```

```
-   n=4;
     while n>=0
     k=1/(n+1)
     n=n-1;
    end
```

```
-   for n=4:-1:0
      k=1/(n+1)
    end
```