[301] Conditions

Based on slides created by Tyler Caraza-Harter

Learning Objectives Today

Reason about conditions

- Conditional execution
- Alternate execution
- Chained execution
- Nested conditions

Chapter 5 of Think Python (skip "Recursion" sections)

Understand code blocks

- Be able to identify the lines of code in the same block

Sanity checking

- Recognize errors
- Sanitize bad data automatically

Today's Outline

Review

Control Flow Diagrams

Basic syntax for “if”

Identifying code blocks

Demos

Indentation Example

what does it print?

```
print(“A”)
print(“B”)

def print_letters():
    print(“C”)
    print(“D”)

print(“E”)
print(“F”)

print_letters()
```

Indentation Example

```
print(“A”)
print(“B”)

def print_letters():
    print(“C”)
    print(“D”)

print(“E”)
print(“F”)

print_letters()
```

what does it print?

```
A
B
E
F
C
D
```

Indentation Example

```
print(“A”)
print(“B”)

def print_letters():
    print(“C”)
    print(“D”)

print(“E”)
print(“F”)

print_letters()
```

indented, so “inside” print_letters function

what does it print?

```
A
B
E
F
C
D
```

Indentation Example

what does it print?

```
print("A")
print("B")

def print_letters():
    print("C")
    print("D")

print("E")
print("F")

print_letters()
```

indented, so "inside" print_letters function

printed last because print_letters is called last

A
B
E
F
C
D

Indentation Example

```
print("A")
print("B")

def print_letters():
    print("C")
    print("D")

print("E")
print("F")

print_letters()
```

indented, so "inside" print_letters function

what does it print?

A
B
E
F
C
D

Indentation Example

```
print("A")
print("B")

def print_letters():
    print("C")
    print("D")

print("E")
print("F")

print_letters()
```

not indented, so "outside" any function

indented, so "inside" print_letters function

what does it print?

A
B
E
F
C
D

Indentation Example

```
print(“A”)
print(“B”)

def print_letters():
    print(“C”)
    print(“D”)

print(“E”)
print(“F”)

print_letters()
```

not indented, so “outside” any function

indented, so “inside” print_letters function

also not indented, so “outside” any function. Runs BEFORE print_letters is called

what does it print?

A
B
E
F
C
D

Indentation Example

```
print("A")
print("B")

def print_letters():
    print("C")
    print("D")

print("E")
print("F")

print_letters()
```

not indented, so **"outside"** any function

indented, so **"inside"** print_letters function

also not indented, so **"outside"** any function. Runs BEFORE print_letters is called

what does it print?

A
B
E
F
C
D

We use **indenting** to tell Python which code is **inside** or **outside** of a function (or other things we'll learn about soon).

Indentation Example

```
print(“A”)
print(“B”)

def print_letters():
    print(“C”)
    print(“D”)

print(“E”)
print(“F”)

print_letters()
```

not indented, so **“outside”** any function

indented, so **“inside”** print_letters function

blank lines are **irrelevant**

also not indented, so **“outside”** any function. Runs BEFORE print_letters is called

what does it print?

A
B
E
F
C
D

We use **indenting** to tell Python which code is **inside** or **outside** of a function (or other things we’ll learn about soon).

Indentation Example

```
print("A")
print("B")

def print_letters():
    print("C")
    print("D")

print("E")
print("F")

print_letters()
```

we'll often call the lines of code **inside** something a **"block"** of code

what does it print?

A
B
E
F
C
D

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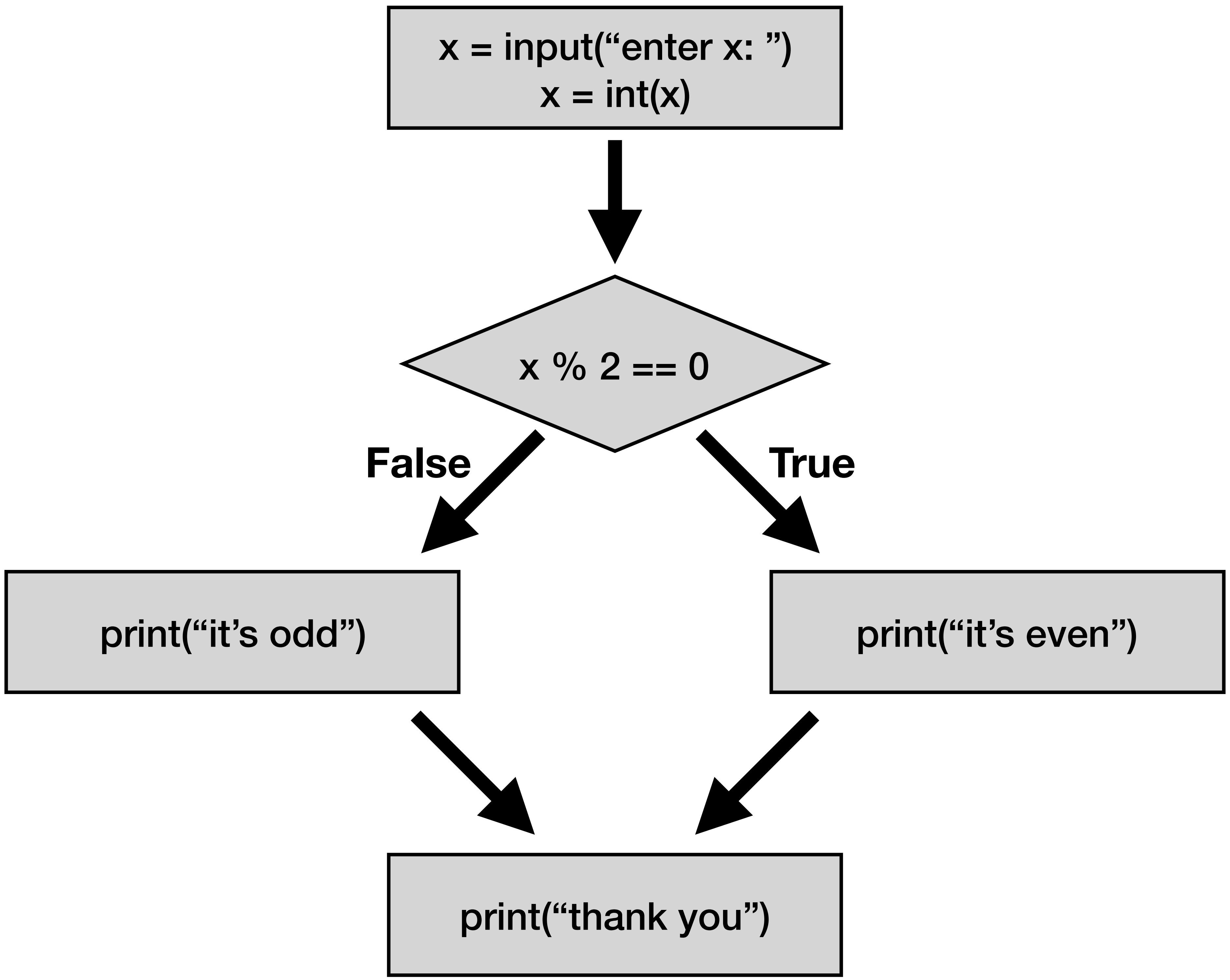
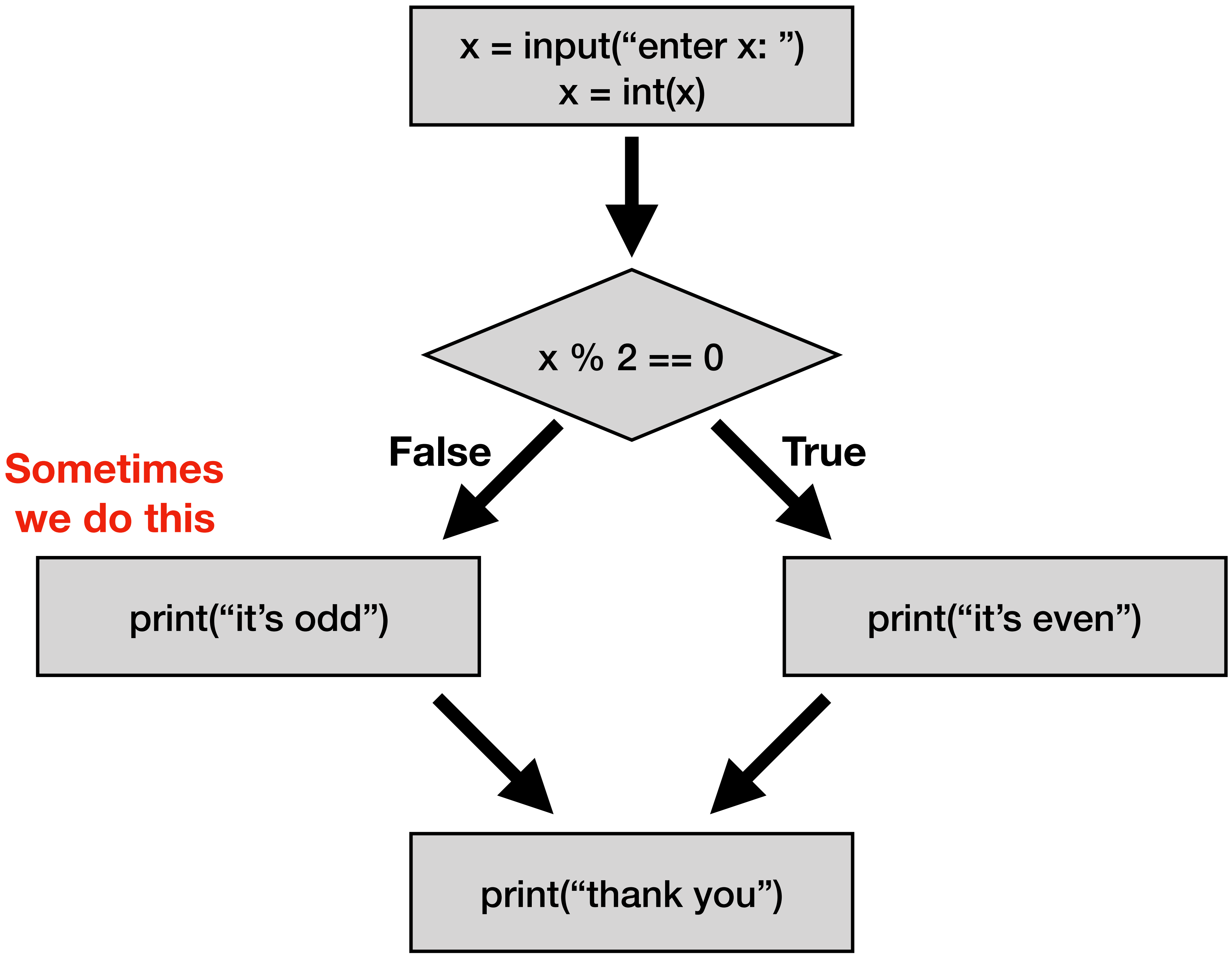
Identifying code blocks

Demos

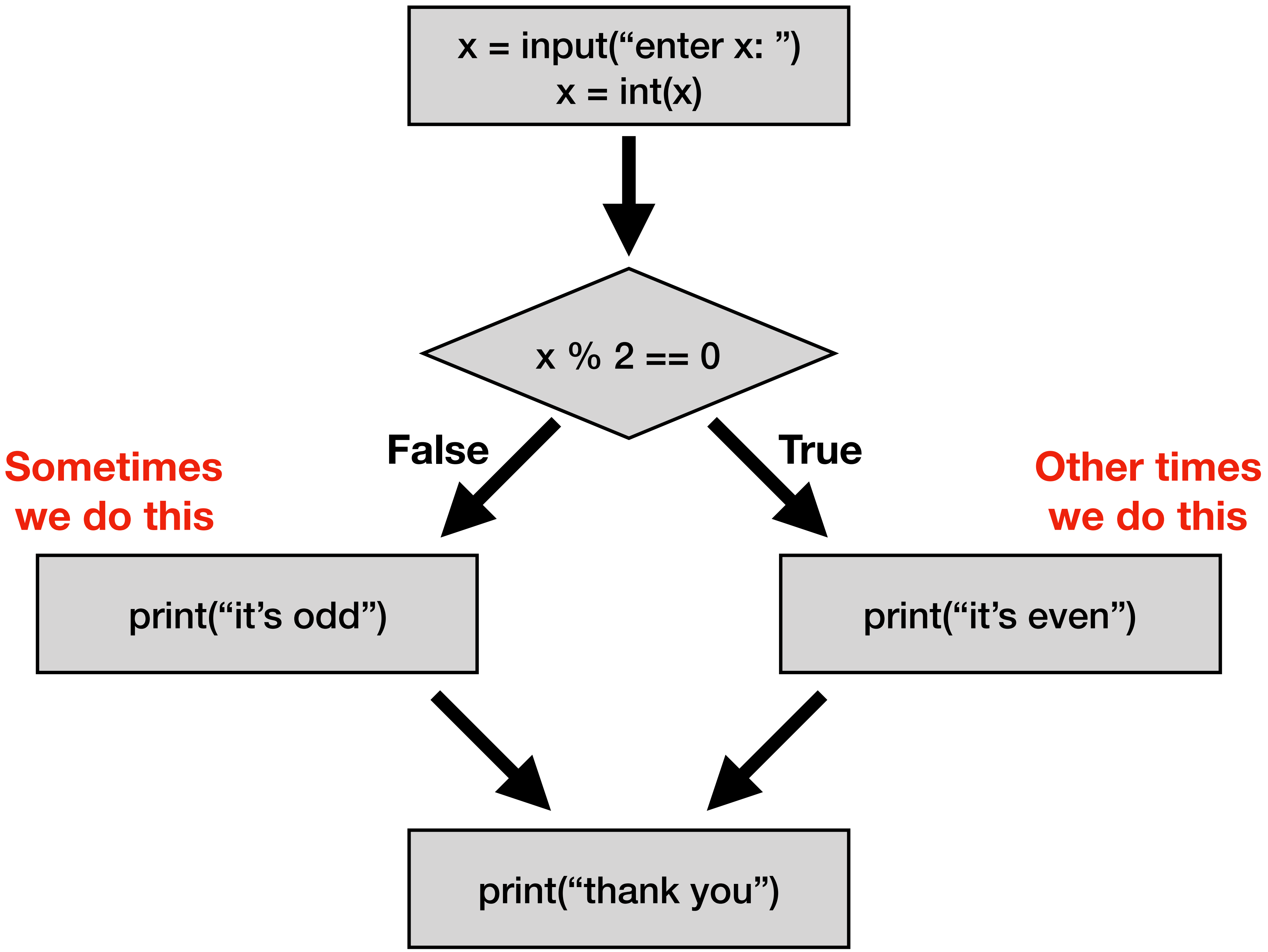
Control Flow Diagrams



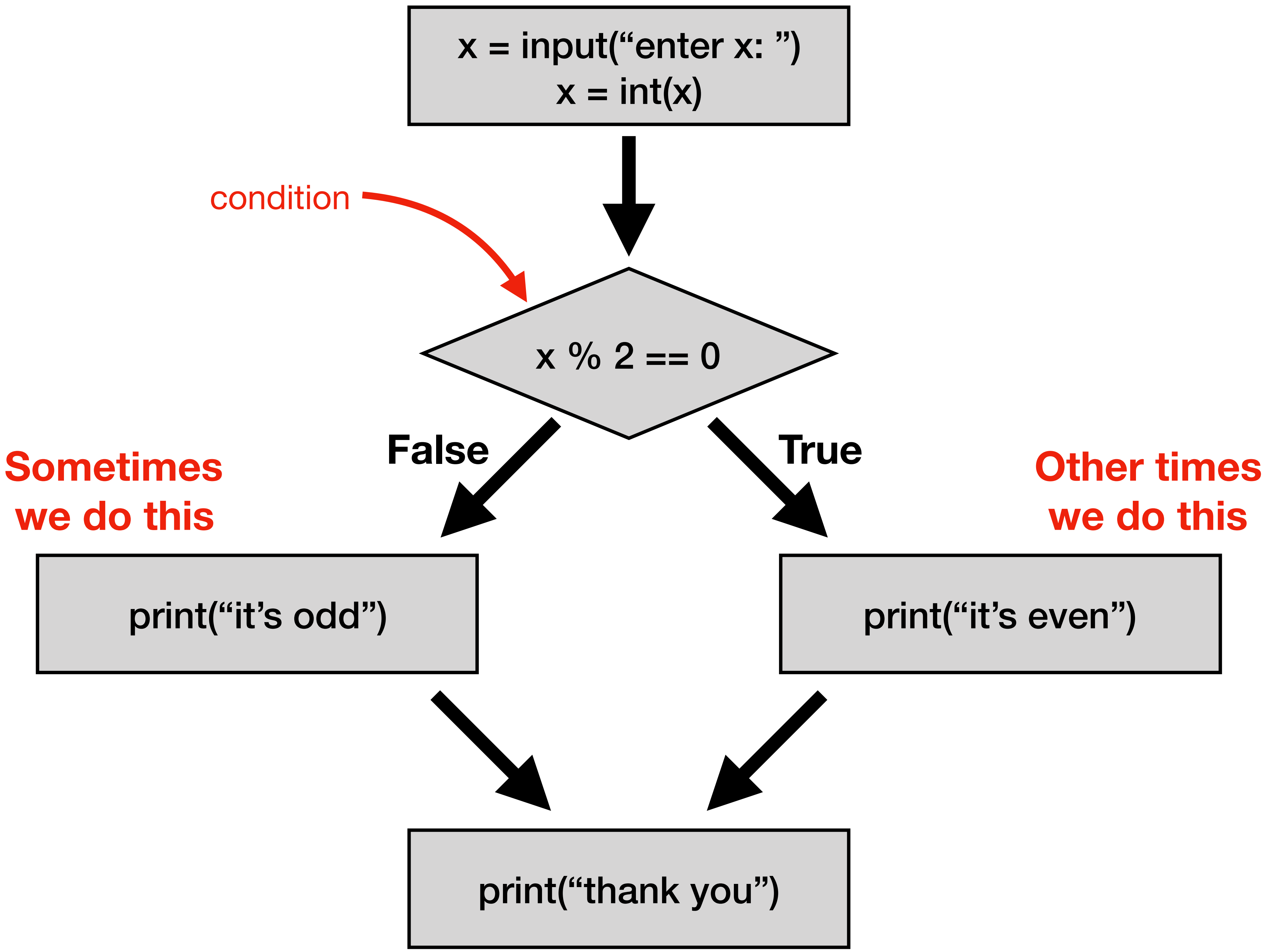
Control Flow Diagrams



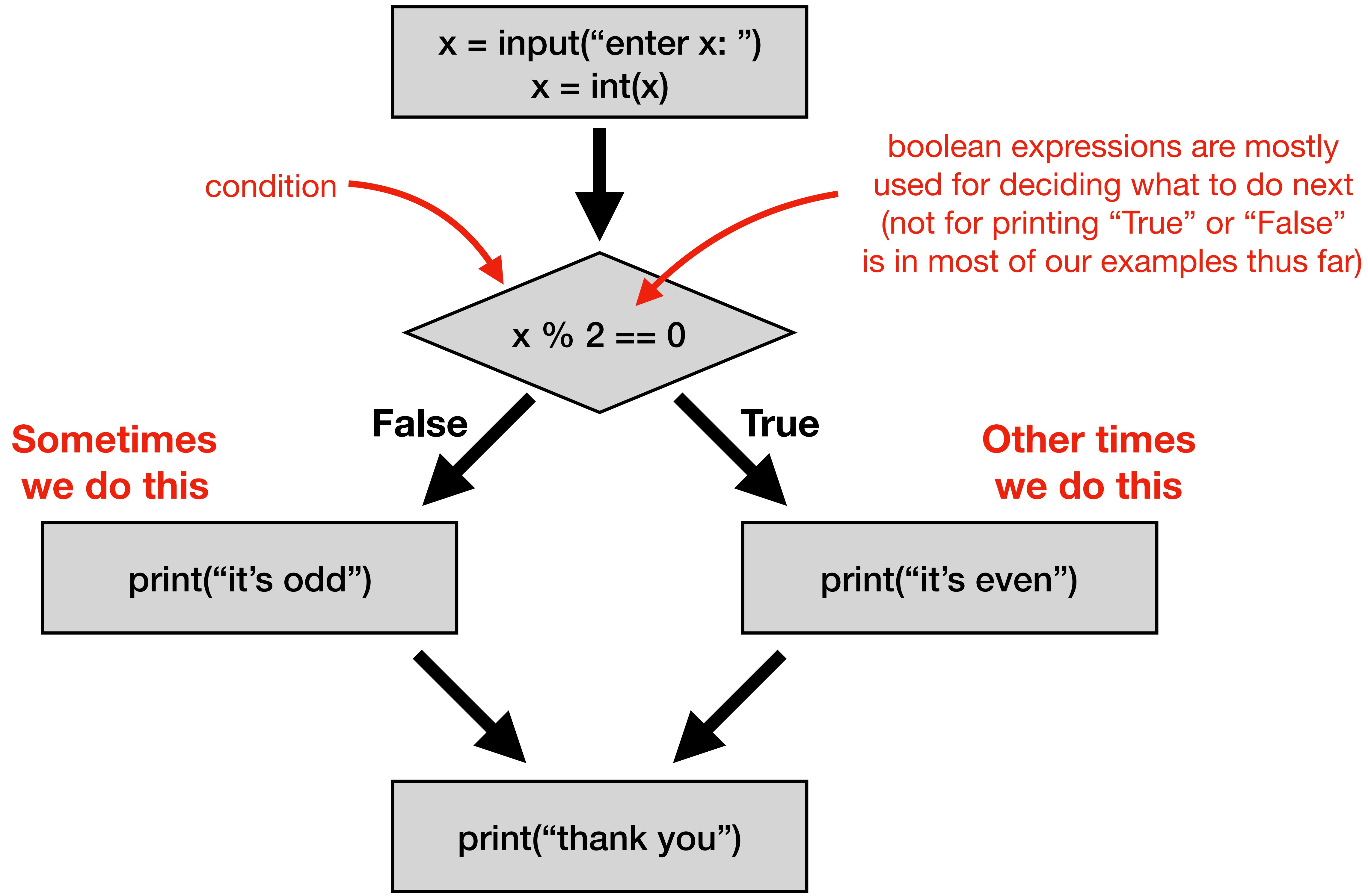
Control Flow Diagrams



Control Flow Diagrams



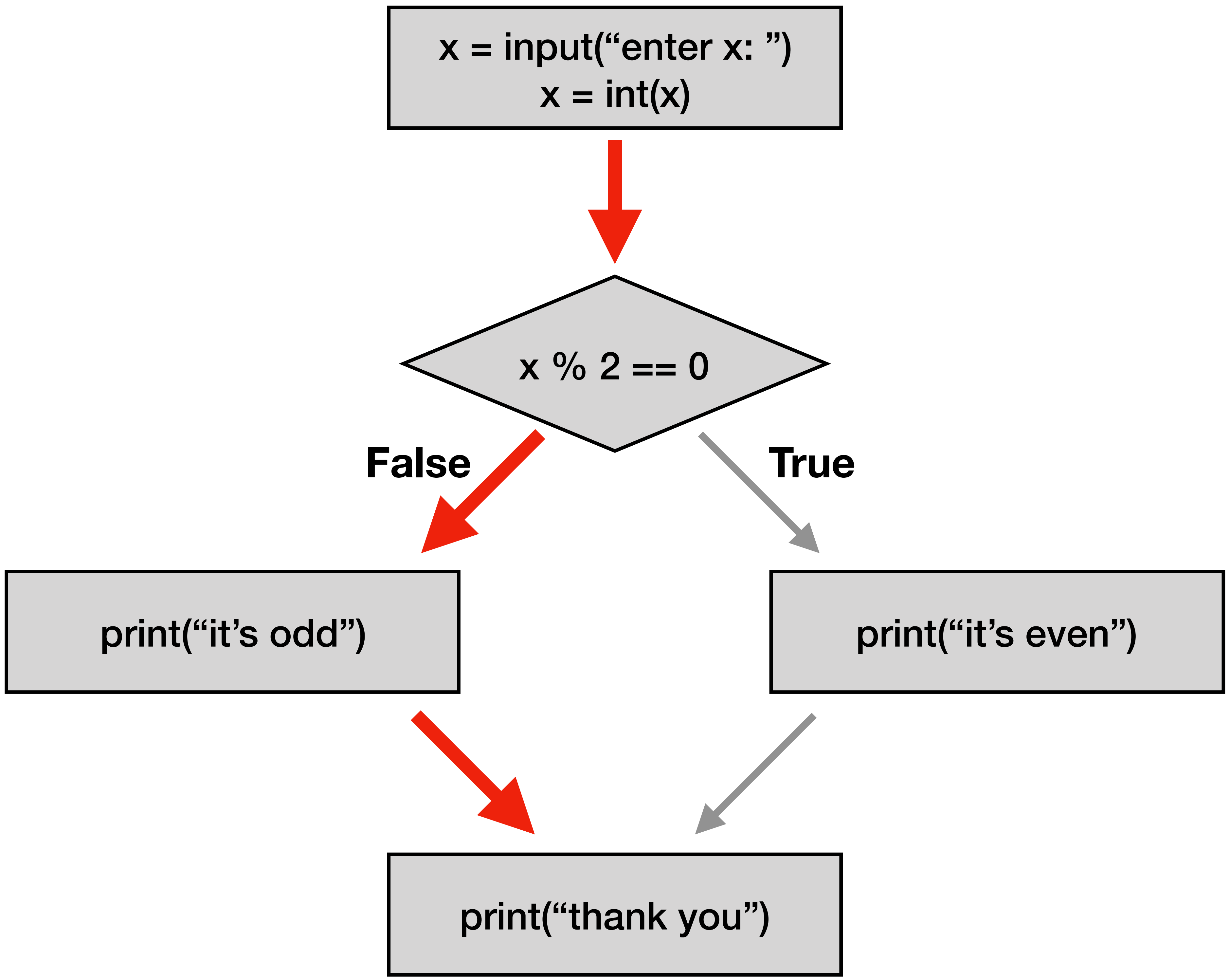
Control Flow Diagrams



“Paths of Execution”

Input/Output:

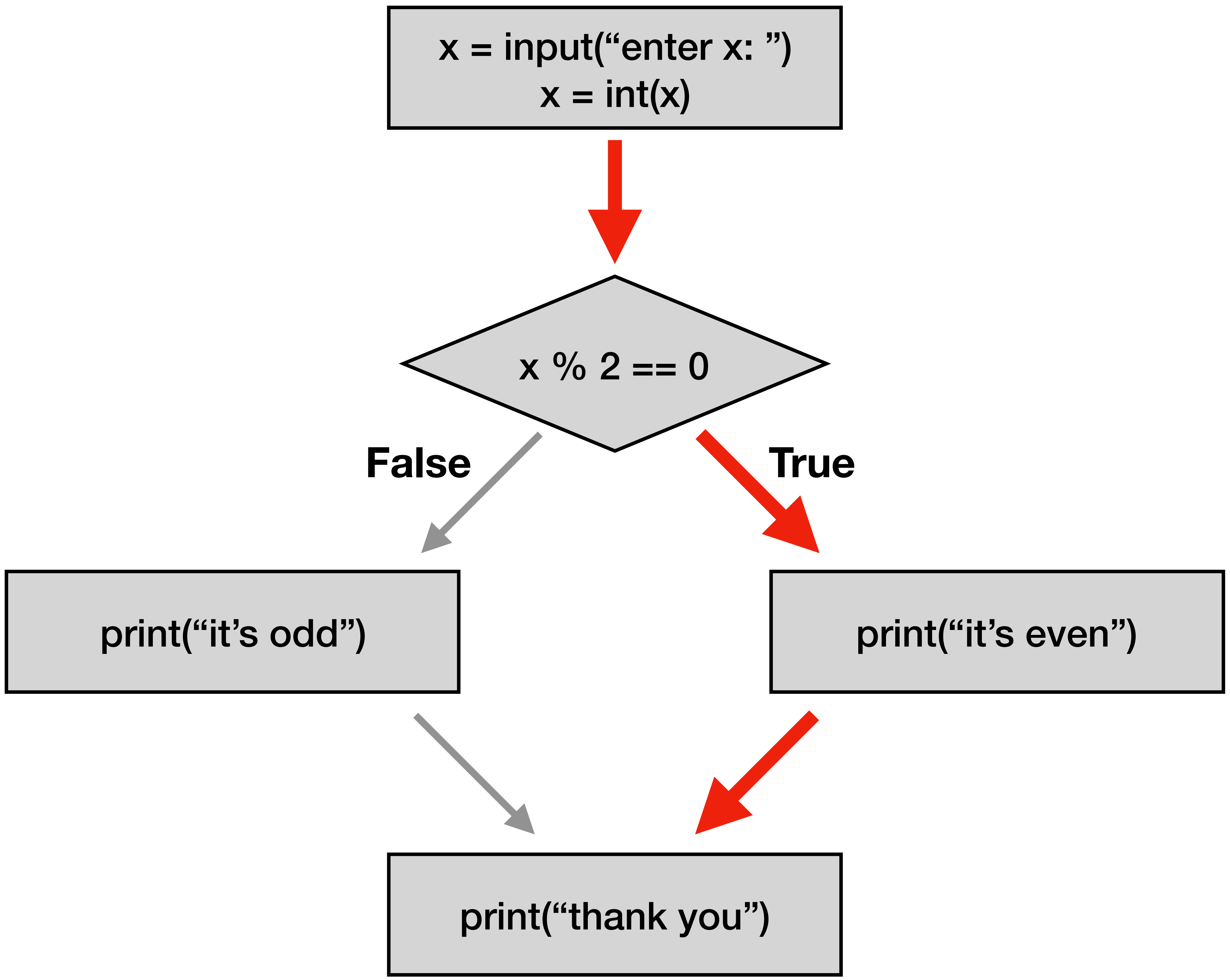
```
enter x: 7
it’s odd
thank you
```



“Paths of Execution”

Input/Output:

```
enter x: 8
it’s even
thank you
```



Today's Outline

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Control Flow Diagrams

Basic syntax for “if”

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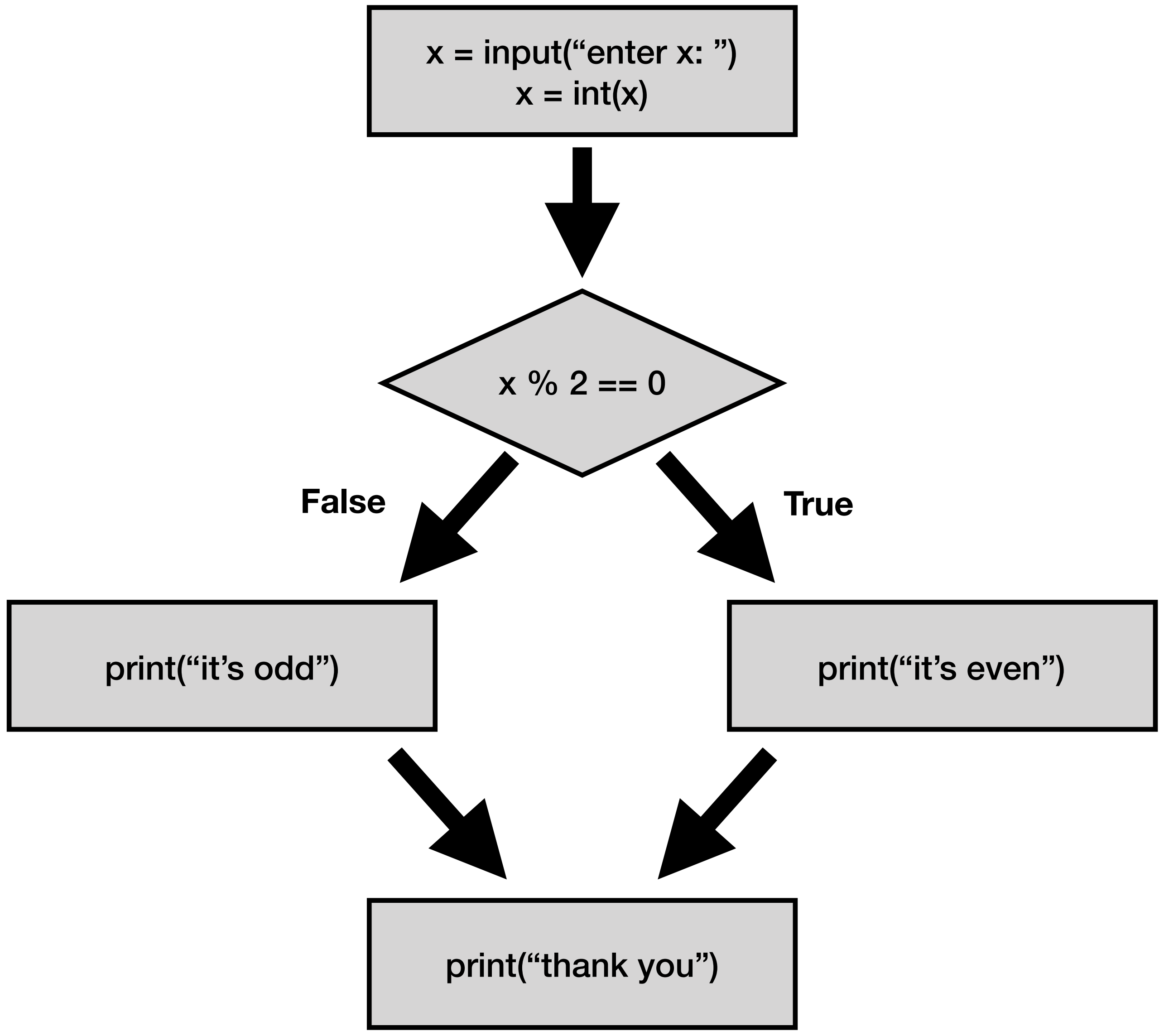
Demos

Writing conditions in Python

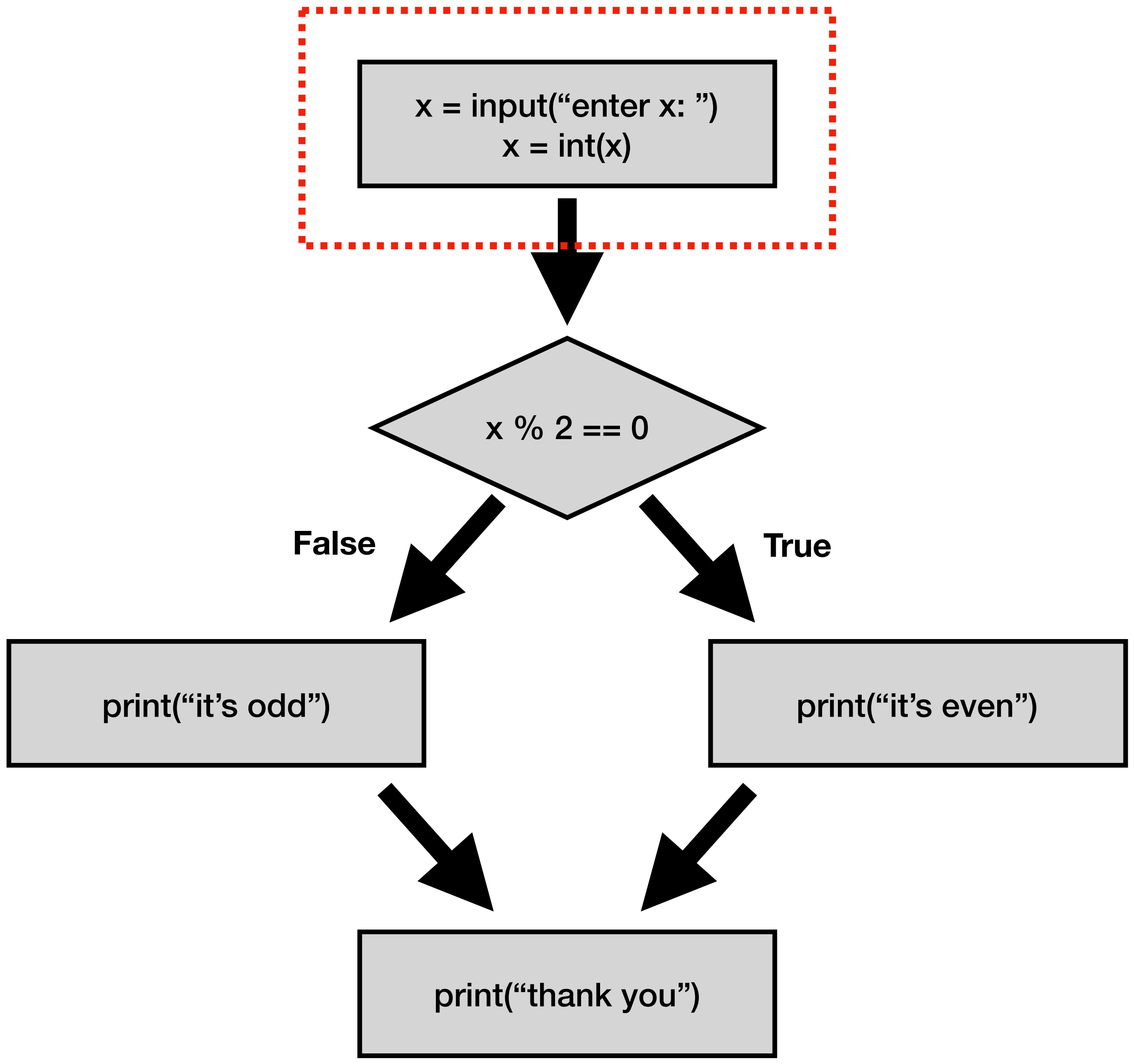
Code:



Writing conditions in Python

Code:

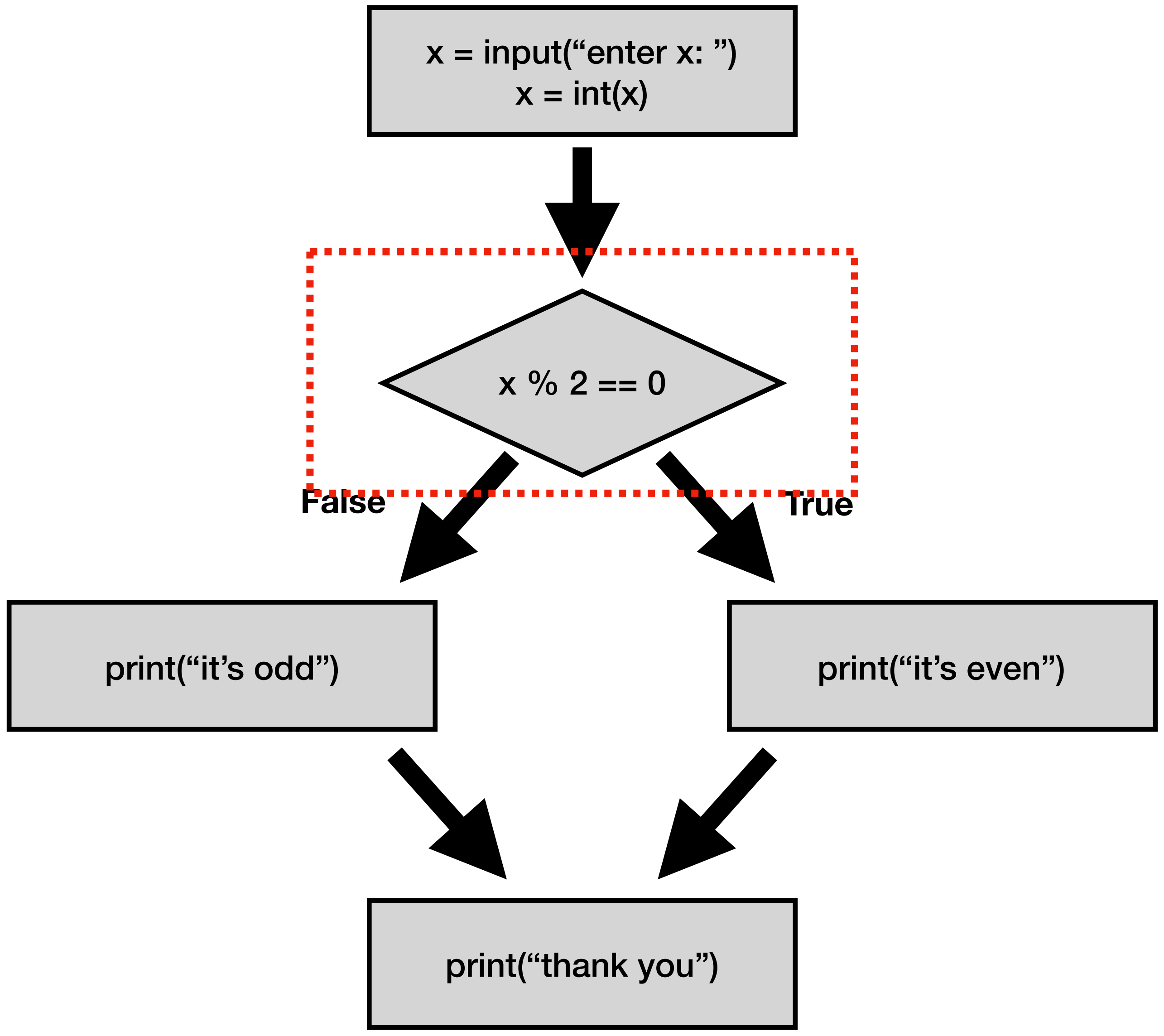
```
x = input("enter x: ")
x = int(x)
```



Writing conditions in Python

Code:

```
x = input("enter x: ")
x = int(x)

if x % 2 == 0:
```

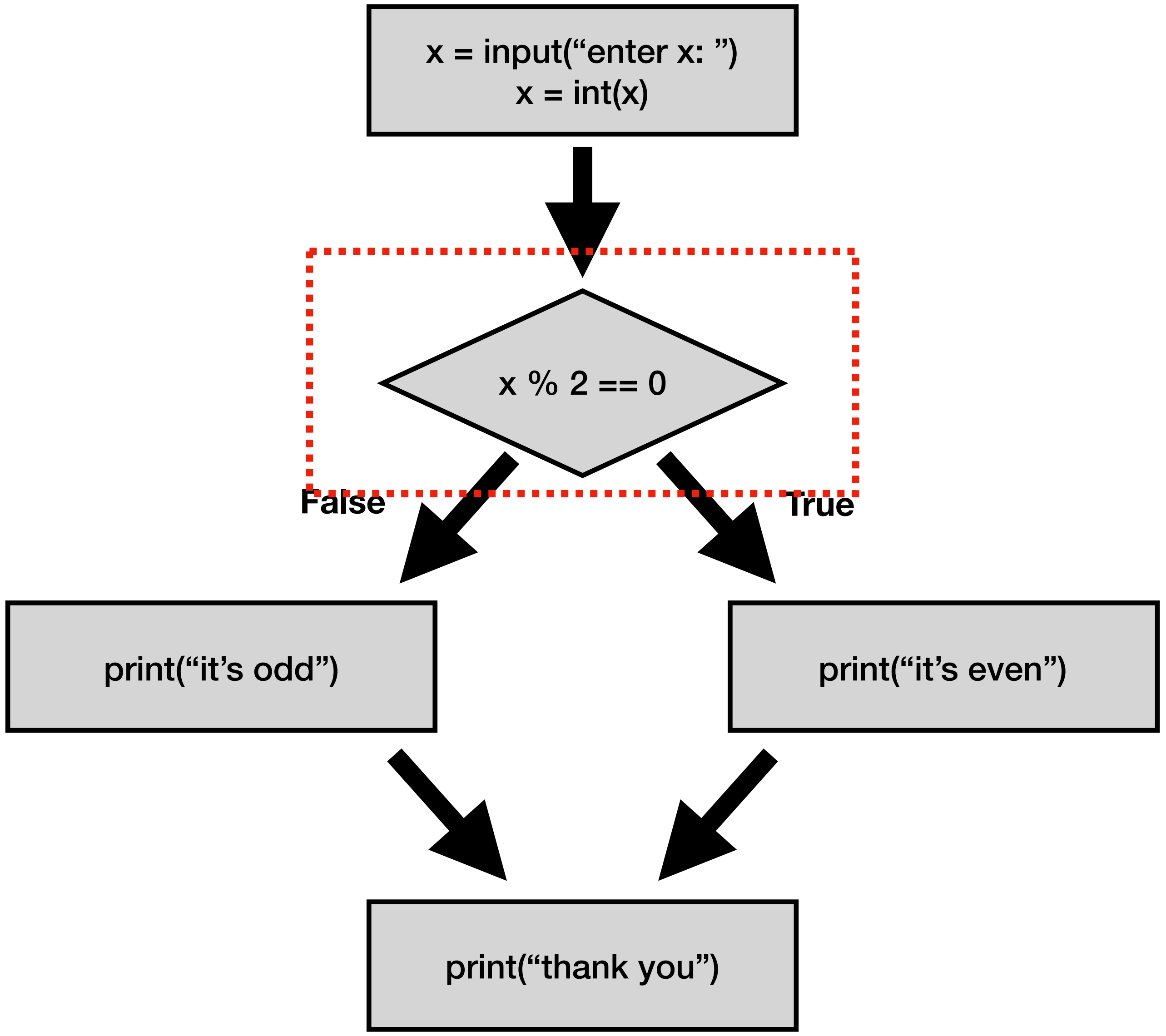


Writing conditions in Python

Code:

```
x = input("enter x: ")
x = int(x)

if x % 2 == 0:
```

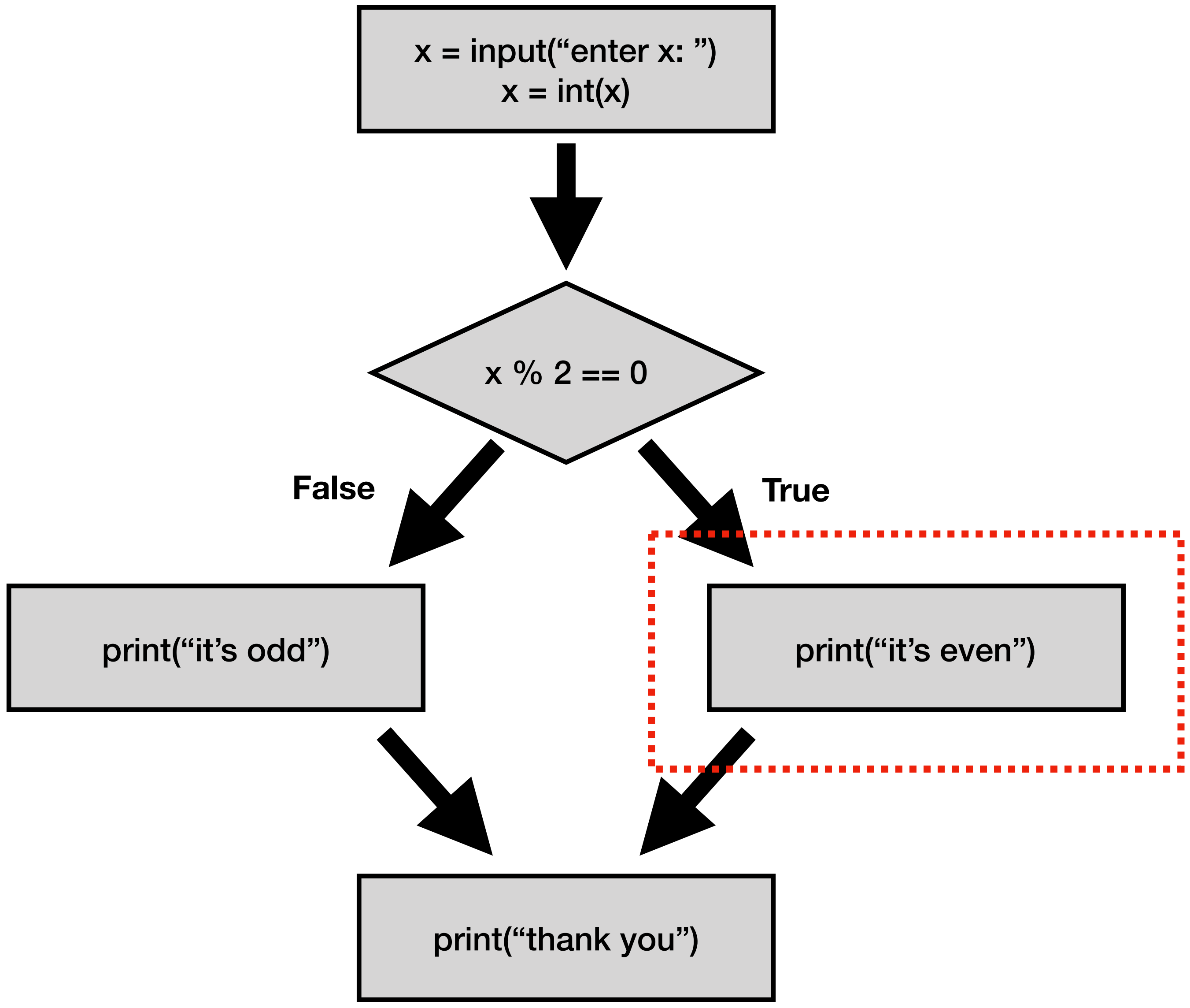
boolean expression



Writing conditions in Python

Code:

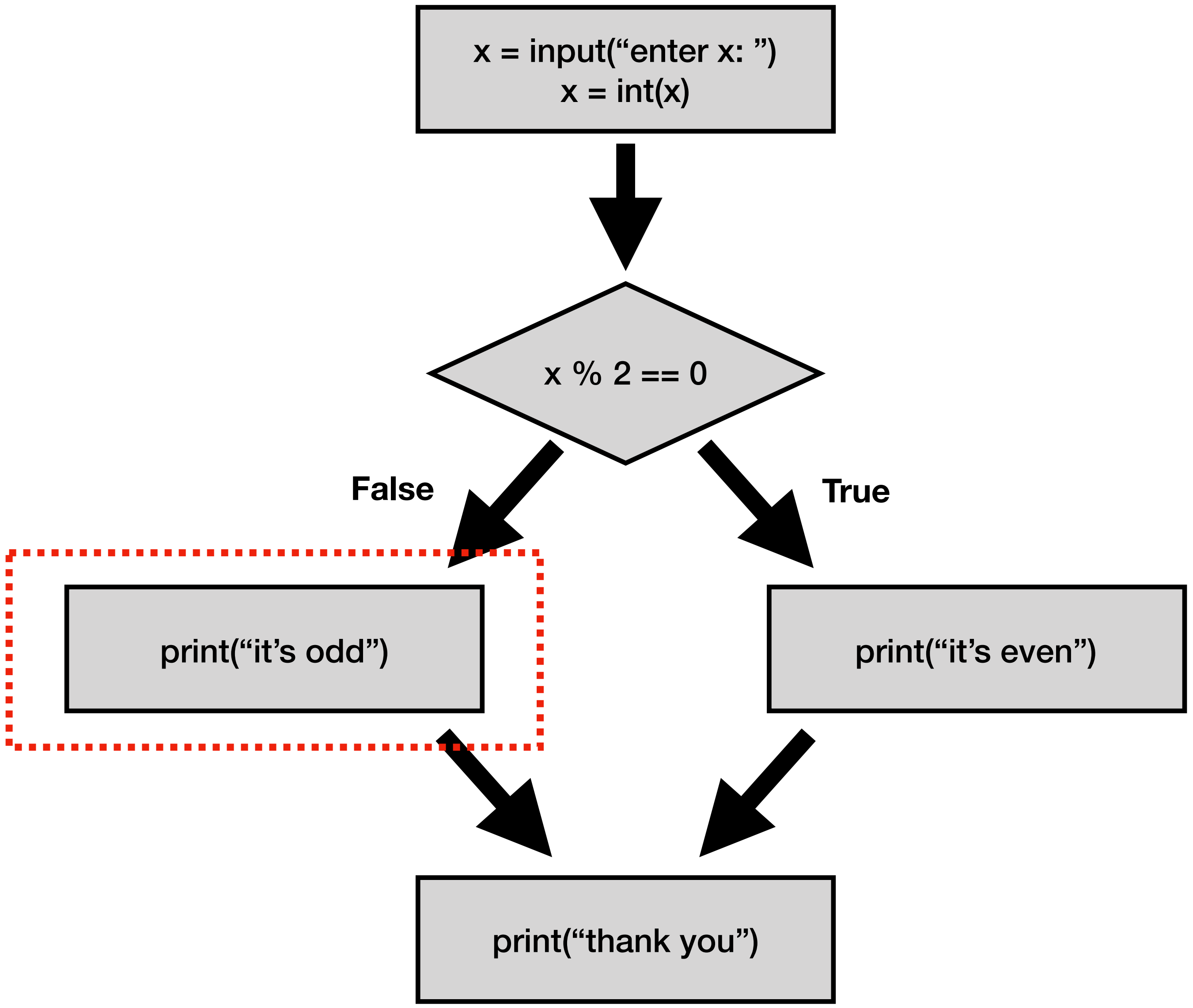
```
x = input("enter x: ")
x = int(x)

if x % 2 == 0:
    print("it's even")
```



Writing conditions in Python

Code:

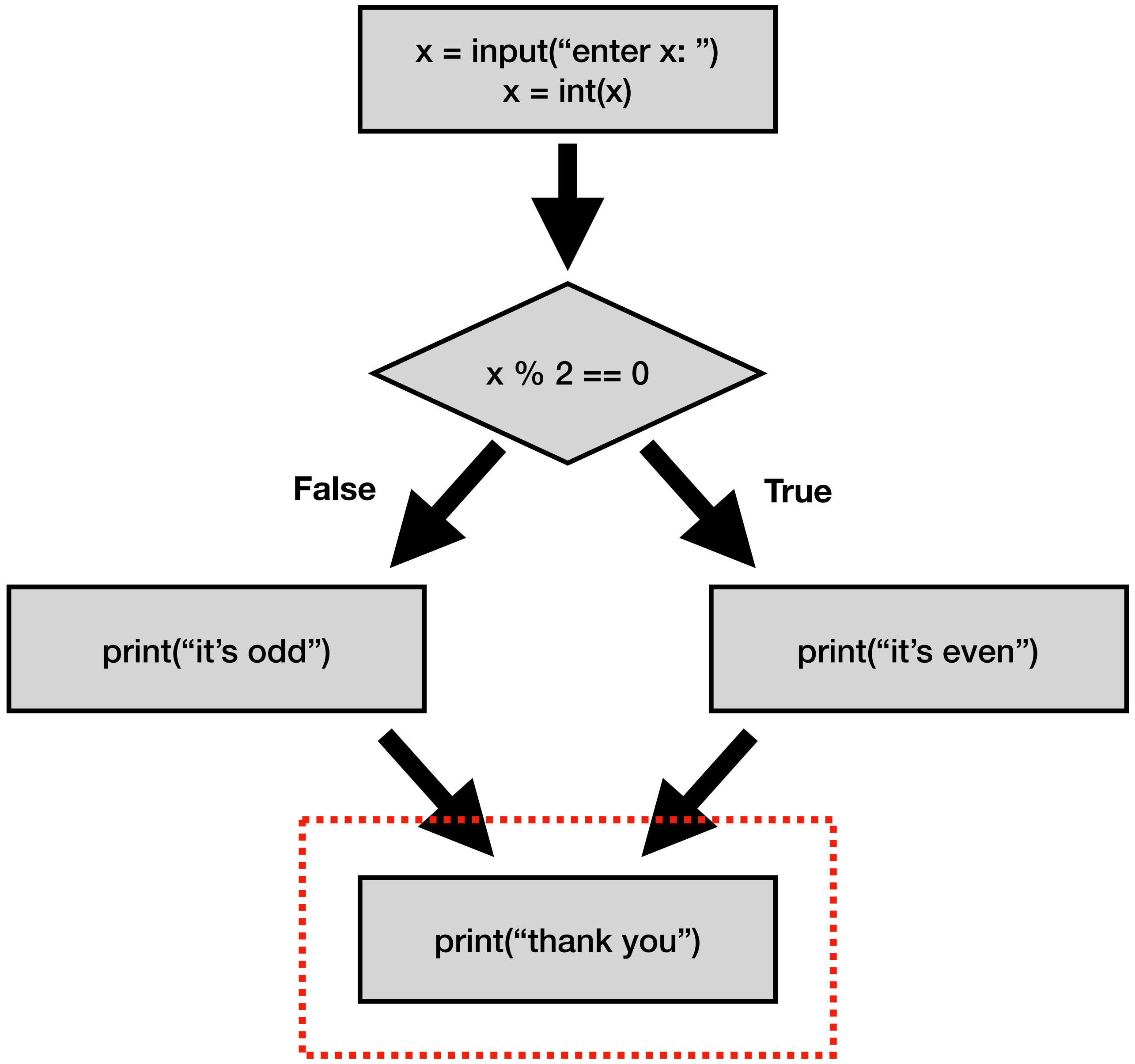
```
x = input(“enter x: ”)
x = int(x)

if x % 2 == 0:
    print(“it’s even”)
else:
    print(“it’s odd”)
```



Writing conditions in Python

Code:

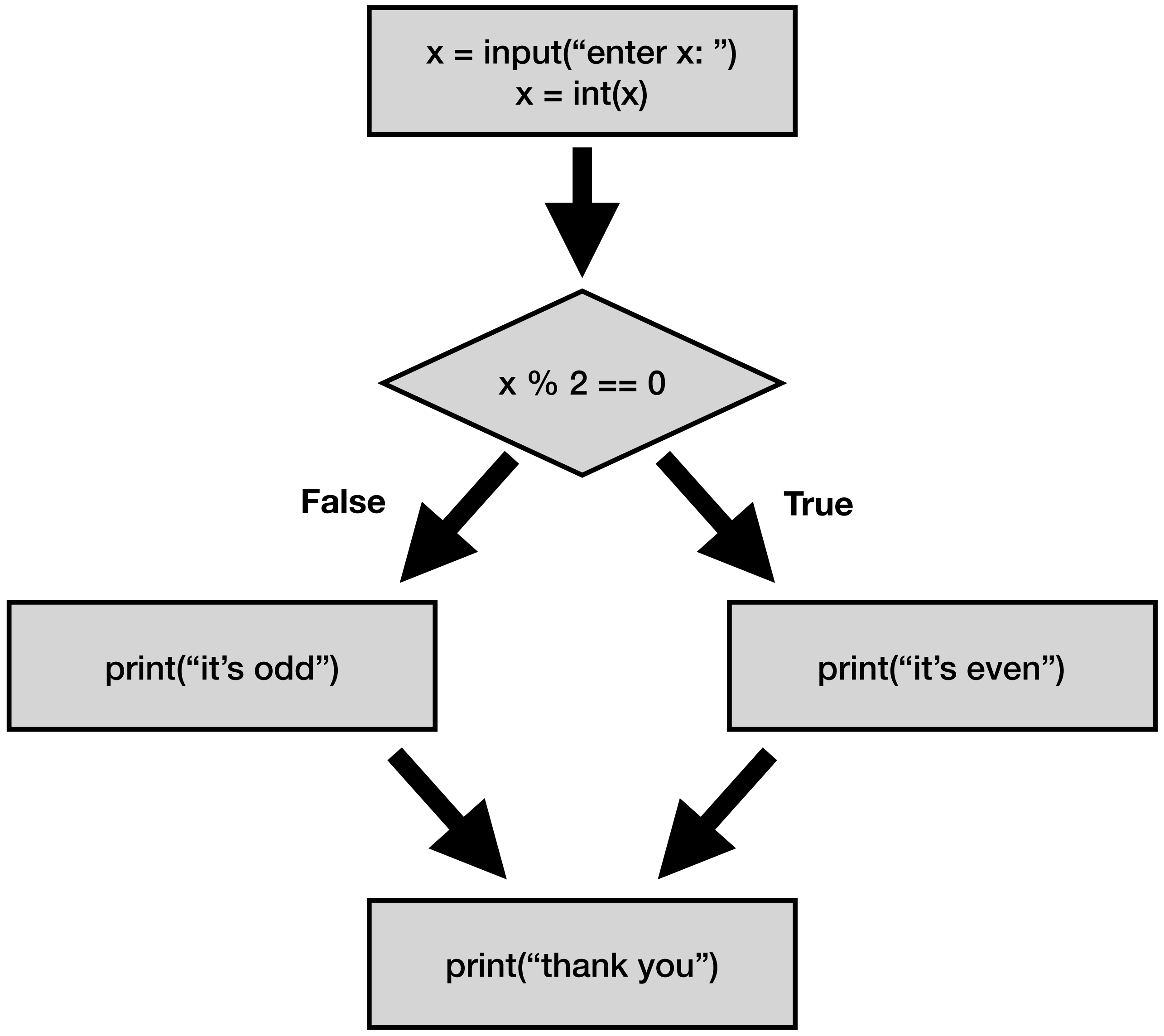
```
x = input(“enter x: ”)
x = int(x)

if x % 2 == 0:
    print(“it’s even”)
else:
    print(“it’s odd”)

print(“thank you”)
```



Writing conditions in Python

Code:

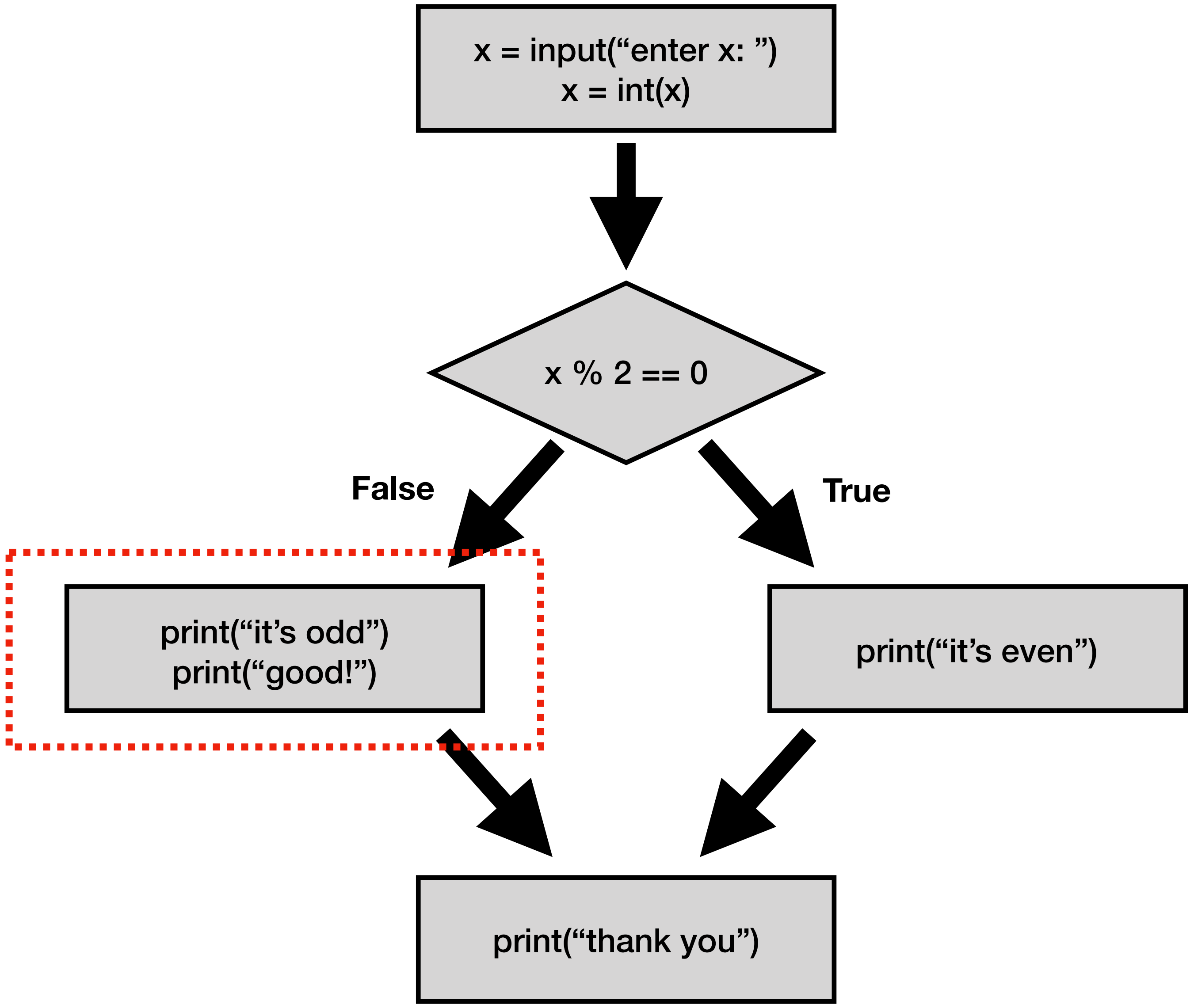
```
x = input(“enter x: ”)
x = int(x)

if x % 2 == 0:
    print(“it’s even”)
else:
    print(“it’s odd”)

print(“thank you”)
```



Writing conditions in Python

Code:

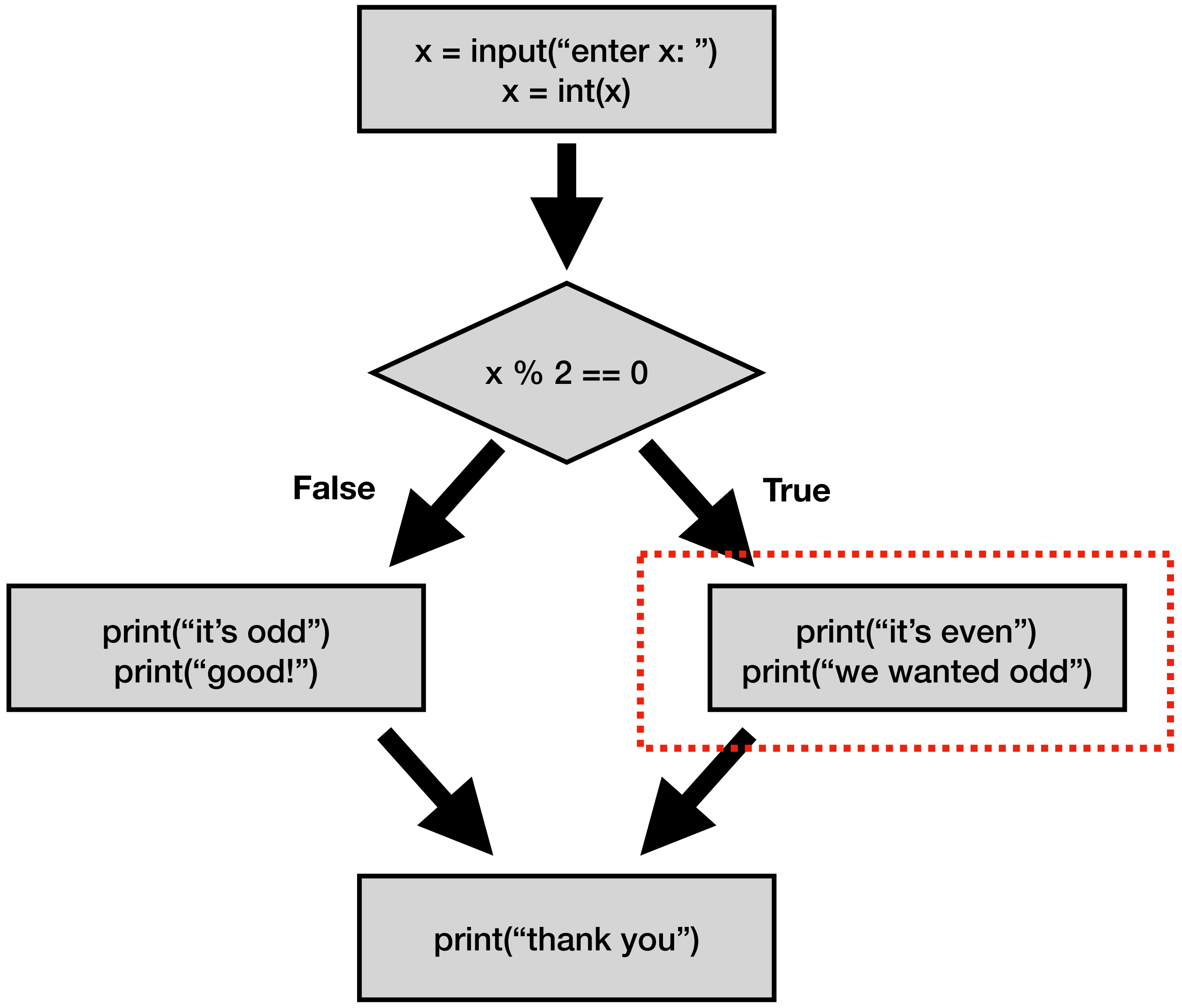
```
x = input(“enter x: ”)
x = int(x)

if x % 2 == 0:
    print(“it’s even”)
else:
    print(“it’s odd”)
    print(“good!”)

print(“thank you”)
```



Writing conditions in Python

Code:

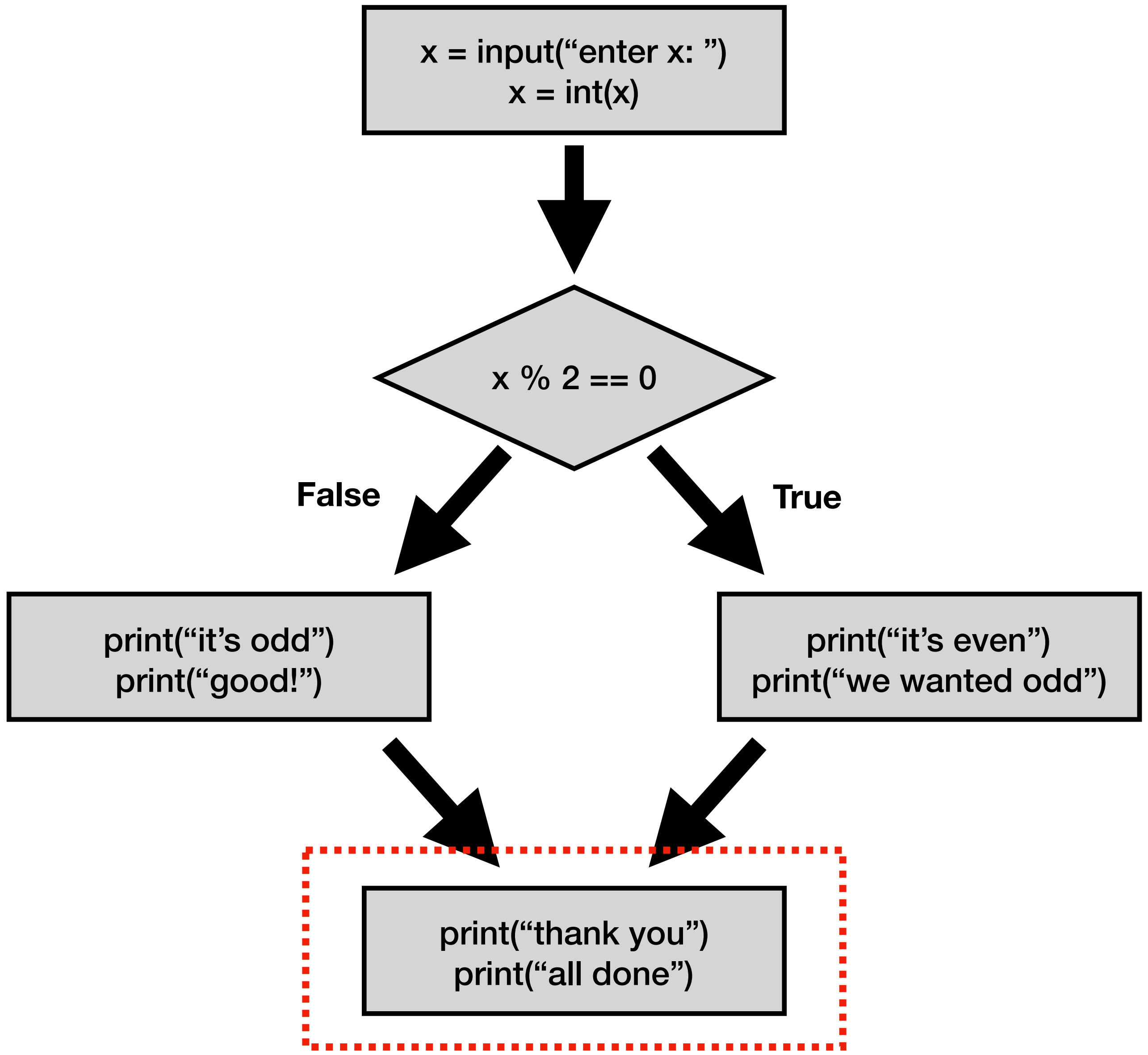
```
x = input(“enter x: ”)
x = int(x)

if x % 2 == 0:
    print(“it’s even”)
    print(“we wanted odd”)
else:
    print(“it’s odd”)
    print(“good!”)

print(“thank you”)
```



Writing conditions in Python

Code:

```
x = input(“enter x: ”)
x = int(x)

if x % 2 == 0:
    print(“it’s even”)
    print(“we wanted odd”)
else:
    print(“it’s odd”)
    print(“good!”)

print(“thank you”)
print(“all done”)
```



Today's Outline

Review

Control Flow Diagrams

Basic syntax for “if”

Identifying code blocks

Demos

Code Blocks

Code:

```
x = input(“enter x: ”)
x = int(x)

if x % 2 == 0:
    print(“it’s even”)
    print(“we wanted odd”)
else:
    print(“it’s odd”)
    print(“good!”)

print(“thank you”)
print(“all done”)
```

Code Blocks

Code:

```
x = input(“enter x: ”)
x = int(x)

if x % 2 == 0:
    print(“it’s even”)
    print(“we wanted odd”)
else:
    print(“it’s odd”)
    print(“good!”)

print(“thank you”)
print(“all done”)
```

block of code
inside “if”

Code Blocks

Code:

```
x = input("enter x: ")
x = int(x)

if x % 2 == 0:
    print("it's even")
    print("we wanted odd")
else:
    print("it's odd")
    print("good!")

print("thank you")
print("all done")
```

block of code inside "if"

block of code inside "else"

Code Blocks

Code:

```
x = input(“enter x: ”)
x = int(x)

if x % 2 == 0:
    print(“it’s even”)
    print(“we wanted odd”)
else:
    print(“it’s odd”)
    print(“good!”)

print(“thank you”)
print(“all done”)
```

block of code inside “if”

block of code inside “else”

What if all this were inside a function?

Code Blocks

Code:

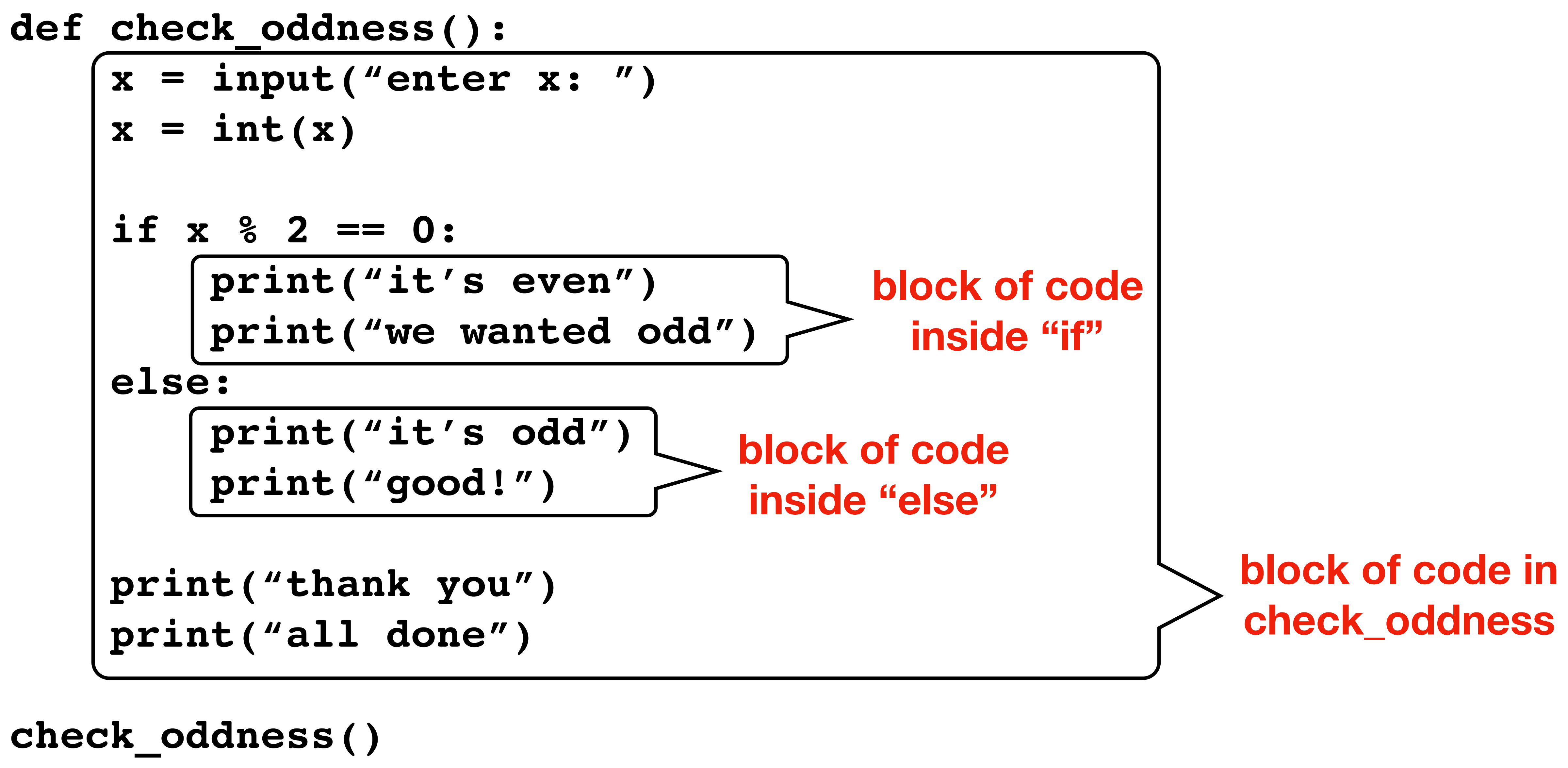
```
def check_oddness():
    x = input(“enter x: ”)
    x = int(x)

    if x % 2 == 0:
        print(“it’s even”)
        print(“we wanted odd”)
    else:
        print(“it’s odd”)
        print(“good!”)

    print(“thank you”)
    print(“all done”)

check_oddness()
```

block of code inside “if”

block of code inside “else”

Code Blocks

Code:



```
def check_oddness():
    x = input(“enter x: ”)
    x = int(x)

    if x % 2 == 0:
        print(“it’s even”)
        print(“we wanted odd”)
    else:
        print(“it’s odd”)
        print(“good!”)

    print(“thank you”)
    print(“all done”)

check_oddness()
```

block of code inside “if”
block of code inside “else”
block of code in check_oddness

Code Blocks

You need to get good at “seeing” code blocks in Python code.

Code:

```
def check_oddness():
    x = input(“enter x: ”)
    x = int(x)

    if x % 2 == 0:
        print(“it’s even”)
        print(“we wanted odd”)
    else:
        print(“it’s odd”)
        print(“good!”)

    print(“thank you”)
    print(“all done”)

check_oddness()
```

block of code inside “if”

block of code inside “else”

block of code in check_oddness

Code Blocks

You need to get good at “seeing” code blocks in Python code.
Even blocks inside blocks inside blocks…

Code:

```
def check_oddness():
    x = input(“enter x: ”)
    x = int(x)

    if x % 2 == 0:
        print(“it’s even”)
        print(“we wanted odd”)
    else:
        print(“it’s odd”)
        print(“good!”)

    print(“thank you”)
    print(“all done”)

check_oddness()
```

block of code inside “if”

block of code inside “else”

block of code in check_oddness

Identifying Code Blocks

Code:

```
def check_oddness():
    x = input(“enter x: ”)
    x = int(x)

    if x % 2 == 0:
        print(“it’s even”)
        print(“we wanted odd”)
    else:
        print(“it’s odd”)
        print(“good!”)

    print(“thank you”)
    print(“all done”)

check_oddness()
```

Identifying Code Blocks

Code:

```
def check_oddness():
    x = input(“enter x: ”)
    x = int(x)

    if x % 2 == 0:
        print(“it’s even”)
        print(“we wanted odd”)
    else:
        print(“it’s odd”)
        print(“good!”)

    print(“thank you”)
    print(“all done”)

check_oddness()
```

Step 1: look for a colon at end of a line

Identifying Code Blocks

Code:

```
def check_oddness():
    x = input("enter x: ")
    x = int(x)

    if x % 2 == 0:
        print("it's even")
        print("we wanted odd")
    else:
        print("it's odd")
        print("good!")

    print("thank you")
    print("all done")

check_oddness()
```

Step 2: start drawing a line on next code line, indented in

Identifying Code Blocks

Code:

```
def check_oddness():
    x = input(“enter x: ”)
    x = int(x)

    if x % 2 == 0:
        print(“it’s even”)
        print(“we wanted odd”)
    else:
        print(“it’s odd”)
        print(“good!”)

    print(“thank you”)
    print(“all done”)

check_oddness()
```

Step 3: continue down until you hit code that is less indented

Identifying Code Blocks

Code:

```
def check_oddness():
    x = input(“enter x: ”)
    x = int(x)

    if x % 2 == 0:
        print(“it’s even”)
        print(“we wanted odd”)
    else:
        print(“it’s odd”)
        print(“good!”)

    print(“thank you”)
    print(“all done”)

check_oddness()
```

Step 4: box off the code

Identifying Code Blocks

Code:

```
def check_oddness():
    x = input(“enter x: ”)
    x = int(x)

    if x % 2 == 0:
        print(“it’s even”)
        print(“we wanted odd”)
    else:
        print(“it’s odd”)
        print(“good!”)

    print(“thank you”)
    print(“all done”)

check_oddness()
```

Step 4: box off the code

Identifying Code Blocks

Code:

```
def check_oddness():
    x = input(“enter x: ”)
    x = int(x)

    if x % 2 == 0:
        print(“it’s even”)
        print(“we wanted odd”)
    else:
        print(“it’s odd”)
        print(“good!”)

    print(“thank you”)
    print(“all done”)

check_oddness()
```

to find more boxes, look for the next colon and repeat

Identifying Code Blocks

Code:

```
def check_oddness():
    x = input(“enter x: ”)
    x = int(x)

    if x % 2 == 0:
        print(“it’s even”)
        print(“we wanted odd”)
    else:
        print(“it’s odd”)
        print(“good!”)

    print(“thank you”)
    print(“all done”)

check_oddness()
```

to find more boxes,
look for the next colon
and repeat

Identifying Code Blocks

Code:

```
def check_oddness():
    x = input("enter x: ")
    x = int(x)

    if x % 2 == 0:
        print("it's even")
        print("we wanted odd")
    else:
        print("it's odd")
        print("good!")

    print("thank you")
    print("all done")

check_oddness()
```

to find more boxes, look for the next colon and repeat

Identifying Code Blocks

Code:

```
def check_oddness():
    x = input("enter x: ")
    x = int(x)

    if x % 2 == 0:
        print("it's even")
        print("we wanted odd")
    else:
        print("it's odd")
        print("good!")

    print("thank you")
    print("all done")

check_oddness()
```

to find more boxes, look for the next colon and repeat

Identifying Code Blocks

Do practice problems on worksheet

Code:

```
def check_oddness():
    x = input("enter x: ")
    x = int(x)

    if x % 2 == 0:
        print("it's even")
        print("we wanted odd")
    else:
        print("it's odd")
        print("good!")

    print("thank you")
    print("all done")

check_oddness()
```

to find more boxes,
look for the next colon
and repeat

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Basic syntax for “if”

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Demos ⬅