Homework: C Operators

This document defines the homework assignments from the "C Programming" Course @ Software University. Please submit as homework a single **`zip`** / **`rar`** / **`7z`** archive holding the solutions (source code) of all below described problems.

Problem 1. Odd or Even Integers

Write an expression that checks if given integer is **odd or even**. Examples:

n	Odd?
3	1
2	0
-2	0
-1	1
0	0

Problem 2. Big and Odd

Write a program that that prints if the number is both **greater than 20** and **odd**.

n	Result
63	1
17	0
22	0
23	1
20	0

Problem 3. Pure Divisor

Write a program that prints if a number is **divided** by 9, 11 or 13 **without remainder**.

n	Result
121	1
1263	0
26	1
23	0
81	1
1287	1

Problem 4. Gravitation on the Moon

The gravitational field of the Moon is approximately 17% of that on the Earth. Write a program that calculates the **weight of a man on the moon** by a given weight on the Earth. Examples:

weight	weight on the Moon
86	14.620
74.6	12.682
53.7	9.1290

Problem 5. Divide by 7 and 5

Write a Boolean expression that checks for given integer if it can be **divided** (without remainder) **by 7 and 5 in the same time**. Examples:

n	Divided by 7 and 5?
3	0
0	0
5	0
7	0
35	1
140	1

Problem 6. Rectangles

Write an expression that calculates **rectangle's perimeter** and **area** by given **`width`** and **`height`**. Examples:

width	height	perimeter	area
3	4	14	12.0
2.5	3	11	7.5
5	5	20	25.0

Problem 7. Average Sum

Write a program that finds the **average** of the **sum of 3** numbers.

a	b	c	Average
45	41	20	35.33333
22	52	60	44.66667

Problem 8. Third Digit is 7?

Write **an expression** that checks for given integer **if its third digit** from right-to-left **is 7**. Print **true** or **false**:

n	Third digit 7?
5	false
701	true
9703	true
877	false
777877	false
9999799	true

Problem 9. Four-Digit Number

Write a program that takes as input a **four-digit number** in format **abcd** (e.g. **2011**) and performs the following:

- Calculates the sum of the digits (in our example **2+0+1+1** = **4**).
- Prints on the console the number in reversed order: **dcba** (in our example **1102**).
- Puts the last digit in the first position: **dabc** (in our example **1201**).
- Exchanges the second and the third digits: **acbd** (in our example **2101**).

The number has always exactly **4 digits** and cannot start with **0**. Examples:

n	sum of digits	reversed	last digit in front	second and third digits exchanged
2011	4	1102	1201	2101
3333	12	3333	3333	3333
9876	30	6789	6987	9786

Problem 10. N-th Digit

Write a program that prints the **n**-th digit of a number (from right to left). If no such digit exists, print a dash "**-**".

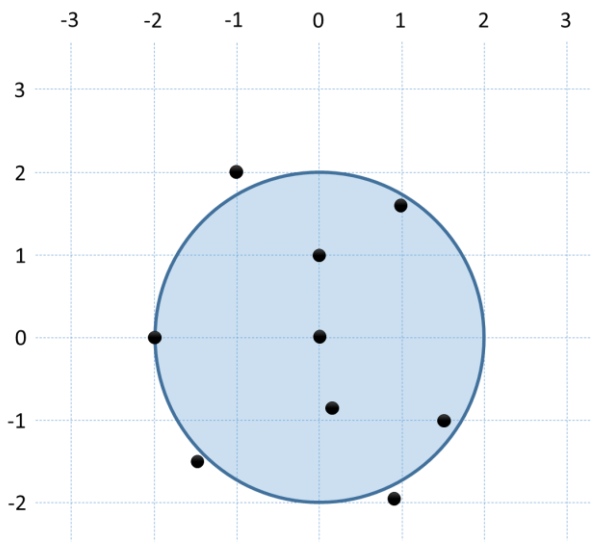
Hint: You need to learn how to use a **while**-loop.

Number	n	Result
2174	3	1
169	2	6
46	4	-

Problem 11. Point in a Circle

Write **an expression** that checks if given point (**x**, **y**) is inside a **circle K**({**0**, **0**}, **2**). Examples:

x	y	inside
0	1	Yes
-2	0	Yes
-1	2	No
1.5	-1	Yes
-1.5	-1.5	No
100	-30	No
0	0	Yes
0.2	-0.8	Yes
0.9	-1.93	No
1	1.655	Yes



Problem 12. Prime Number Check

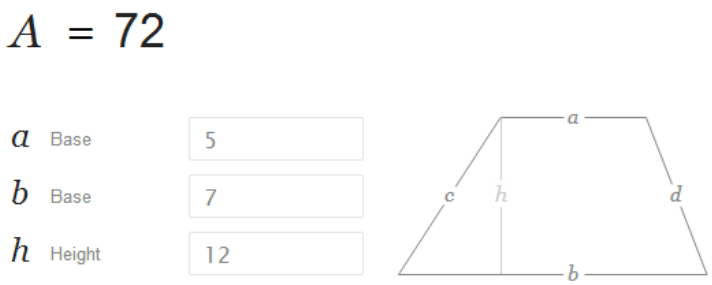
Write an **expression** that checks if given positive integer number **n** (**n** ≤ 100) is **prime** (i.e. it is divisible without remainder only to itself and 1). Print **true** or **false**:

n	Prime?
1	false
2	true
3	true
4	false
9	false
97	true
51	false
-3	false
0	false

Problem 13. Trapezoids

Write an expression that calculates **trapezoid's area** by given sides **a** and **b** and height **h**. Examples:

a	b	h	area
5	7	12	72.00
2	1	33	49.50
8.5	4.3	2.7	17.28
100	200	300	45000.00
0.222	0.333	0.555	0.15



Problem 14. Point Inside a Circle & Outside of a Rectangle

Write an expression that checks for given point (x, y) if it is **within the circle K**({**1**, **1**}, **1.5**) and **out of the rectangle R**(top=**1**, left=**-1**, width=**6**, height=**2**). Print **yes** or **no**:

x	y	inside K & outside of R
1	2	yes
2.5	2	no
0	1	no
2.5	1	no
2	0	no
4	0	no
2.5	1.5	no
2	1.5	yes
1	2.5	yes
-100	-100	no