TC1017 – Solución de Problemas con Programación
Examen 2

Name: _____

Student ID: _____   Date: 25.03.19

Read carefully before answering the questions. This exam is meant to be solved individually.
When answering, try to be as explicit as you can: I will grade based on what it's written. Remember that you can check class materials, the book or your lecture notes. Be mindful of your time. Good luck!

The type of your exam will depend on your Student ID:

$$student = \begin{cases} Minara\,Anemina & = [1,1,1,0.2,0.5] \text{ if the last digit of your student ID } \bmod 3 = 0 \\ Igna\,Phoenix & = [0.2,2,0.5,1,1] \text{ if the last digit of your student ID } \bmod 3 = 1 \\ Ultima\,Thule & = [2,0.2,0.5,2,1] \text{ if the last digit of your student ID } \bmod 3 = 2 \end{cases}$$

My student ID is _____, so the last digit of my ID mod 3 is _____.
Therefore, my student is _____   (2 %)

1.   First Year Spells (60 %)

Analyse each of the following codes, which are used to calculate the cost of the magic spells that students need to learn on their first year on the magical institute.

11.   Fireball

```
1  function output = fireball(x)
2     ease = 2;
3     steps = [1 2];
4     difficulty = steps + 1;
5     cost = sum(difficulty);
6     output = cost * x;
7  end
```

- fireball(student(1))   _____

12.   Freezing Pulse

```
1  function output = freezing_pulse(x)
2     steps = [1 2 3];
3     output =  x * sum(steps);
4  end
```

- freezing_pulse(student(2))   _____

13.   Arc

```
1  function output = arc(x)
2     ease = 1:4;
3     steps = [2 3 1 0];
4     difficulty = ease .* steps;
5     cost = sum(difficulty);
6     output =  x * cost;
7  end
```

- arc(student(3))   _____

14.   Essence Drain

```
1  function output = essence_drain(x)
2     output =  x * sum((1:5:2) .* (1:3));
3  end
```

- essence_drain(student(4))   _____

15.   Summon Skeleton

```
1  function output = skeleton(x)
2     difficulty = zeros(5,1);
3     steps = [2 4 1 1 5];
4     for i = 1:length(steps)
5        difficulty(i) = 2 * steps(i);
6     end
7     cost = difficulty * x;
8     output = sum(cost);
9  end
```

- skeleton(student(5))   _____

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2. Second Year Spells (30 %)

All previous codes generate the mana cost of each of the magic spells that *student* must learn during the core subjects in their first year. However, from the second year onwards, they can choose between **one of the following courses, or both**:

21. Raise Zombie

Summoning a zombie is a very complicated task, since body parts from all over the place are needed. Furthermore, fresh meat is always preferred. To keep all things legal with no funny business going on, the Magical Institute has an agreement with the town's morgue, who provide a table which looks like the following, weekly (consider the numbers will change from week to week!):

ID	Weight	Height	Cause of Death
1	78	1.72	Natural
2	97	1.86	Asphyxia
		⋮	

To determine if a body is useful for reanimation, its potential (calculated as $Weight \times Height$) must be 115 or more.

Write **two functions**:

1. A function which receives the matrix, and returns as a result the number of available bodies for reanimation for a given week (15 %)

2. A function which receives the matrix, and returns the total potential of a given week (15 %)

22. Magma Orb

To practice their aim, students need some shooting targets which will be irremediably consumed by the flames of their spells. For that reason, the magical institute has an agreement with the town's Material and Recycling Centre, who provide a table with the following form, weekly (consider the numbers will change from week to week!):

ID	Units	Material	Compressible
1	2100	Cardboard	Yes
2	3500	Wax	No
3	2700	Oil	No
4	7000	Paper	Yes

To craft shooting targets, 65 % of the **weekly available** cardboard is used, as well as 10 % of paper, 10 % of oil and 15 % of wax (the rest is used for candles).
Furthermore, we know that to make a shooting target, a single unit of each material is needed.
Reflect on the following question... *¿Qué limita el número de dianas que puedo hacer esta semana?*

And now, answer... How many shooting targets can we craft this week? (10 %) —————————————

Write **a function** which receives a matrix like above, and returns the number of shooting targets that can be crafted in a given week(20 %) *Hint: if you don't want to make comparisons, you can use* `min`

3.   Feedback (8 %)

  a) Draw the student you were assigned to (1 %)

  b) Write a name for your magical institute (1 %)

  c) Write a brief opinion on this exam model (3 %)

  d) If fantasy situations can be tackled with programming, do you think programming is useful for real-life scenarios? Why? (3 %)

4.   Challenge (+8 ★)

Write the Flowchart of **any** of the First Year Spells:

In accordance with the Tecnológico de Monterrey Student Code of Honor, my performance in this exam will be guided by academic honesty.