COURSE 1
— MAP101 —
e-training

Myanmar Universities
UGA students - France

2019
Session 5

Exercise 1

These two figures are the graphic outputs of the two following Scilab scripts.

```
// file S05exo1VersionA.sce
// plot small squares centered on a circle
function PlotASquare(xc,yc)
    // plot square centered at point (xc,yc)
    x = [xc - 1, xc, xc + 1, xc, xc - 1];
    y = [yc, yc + 1, yc, yc - 1, yc];
    plot(xc,yc,'.b')
    plot(x,y,'b')
endfunction

// A big circle of radius R
a = 0;
b = 2*%pi;
R = 10;
t = linspace(a,b,400);
x = R*cos(t);
y = R*sin(t);
plot(x,y,'r')

// we format the display
ax = gca();
ax.grid = [3,3] // grid, 3 = green color
ax.isoview = "on";
ax.x_location = "origin";
ax.y_location = "origin";
ax.box = "off";
N = 25;
// N squares centered on the big circle
tt = linspace(a,b,N);
xc = R*cos(tt);
yc = R*sin(tt);
for i = 1 : N
    PlotASquare(xc(i),yc(i))
end
```

```
// file S05exo1VersionB.sce
// plot small circles centered on a circle
function PlotACircle(xc,yc)
    // plot circle centered at point (xc,yc)
    a = 0;
b = 2*%pi;
R = 1;
t = linspace(a,b,200);
x = xc + R*cos(t);
y = yc + R*sin(t);
plot(xc,yc,'.b')
plot(x,y,'b')
endfunction

// A big circle of radius R
a = 0;
b = 2*%pi;
R = 10;
t = linspace(a,b,400);
x = R*cos(t);
y = R*sin(t);
plot(x,y,'r')

// we format the display
ax = gca();
ax.grid = [3,3] // grid, 3 = green color
ax.isoview = "on";
ax.x_location = "origin";
ax.y_location = "origin";
ax.box = "off";
N = 25;
// N circles centered on the big circle
tt = linspace(a,b,N);
xc = R*cos(tt);
yc = R*sin(tt);
for i = 1 : N
    PlotACircle(xc(i),yc(i))
end
```
Exercise 2

The following philosophical / sociological / political quotes have been a bit mixed up with their authors... Can you put some order in this big mess? [information from Wikipedia]

1. “I have a dream that one day this nation will rise up and live out the true meaning of its creed; We hold these truths to be self-evident: that all men are created equal. ”

2. “Reason is the madness of the strongest. The reason of the less strong is madness. ”

3. He was an American professional baseball catcher, who later took on the roles of manager and coach. He is one of only five players to win the American League Most Valuable Player Award three times. He is widely regarded as one of the greatest catchers in baseball history, and was elected to the Baseball Hall of Fame in 1972. He is also known for many tautological or paradoxical statements.

4. “We are brothers by nature, but foreign by education. ”

5. “I think, therefore I am ” or/and “Cogito ergo sum ”

6. Mahatma Gandhi (1869 – 1948)

7. “Education is like a golden pot that nobody can steal. ”

8. He was a Chinese teacher, editor, politician, and philosopher of the Spring and Autumn period of Chinese history. He was born as Kong Qui (family name first and given name last) and is best known in China as Zhongni, which means “Master Kong.” His philosophy, also known as Confucianism, emphasized personal and governmental morality, correctness of social relationships, justice and sincerity.

9. “An eye for an eye will only make the whole world blind. ”

10. “I disapprove of what you say, but I will defend to the death your right to say it ”


12. 

13. “If hatred responds to hatred, how will hatred end? ”
14. He was a French mathematician, physicist, inventor, writer and Catholic theologian. He was a child prodigy who was educated by his father. His earliest work was in the natural and applied sciences where he made important contributions to the study of fluids, and clarified the concepts of pressure and vacuum by generalising the work of Evangelista Torricelli. He wrote a significant treatise on the subject of projective geometry at the age of 16, he wrote an important treatise on the arithmetical triangle and on the cycloid and its use in calculating the volume of solids. He also wrote in defence of the scientific method. In 1642, while still a teenager, he started some pioneering work on calculating machines. After three years of effort and 50 prototypes, he built 20 finished machines (called Pascal’s calculators and later Pascalines).

15. “I like your Christ, I do not like your Christians. Your Christians are so unlike your Christ.”

16. “It is better to risk saving a guilty person than to condemn an innocent one.”

17. “Pin Nyarr Shwe Aoe Luu Ma koe”

18. He was a Romanian-French playwright who wrote mostly in French, and one of the foremost figures of the French Avant-garde theatre. Beyond ridiculing the most banal situations, his plays depict the solitude and insignificance of human existence in a tangible way.

19. René Descartes (1596 – 1650)

20. He was an American Baptist minister and activist who became the most visible spokesperson and leader in the civil rights movement from 1954 until his assassination in 1968. Born in Atlanta, he is best known for advancing civil rights through nonviolence and civil disobedience, tactics his Christian beliefs and the nonviolent activism of Mahatma Gandhi helped inspire. In particular, he helped organize the 1963 March on Washington, where he delivered his famous “I Have a Dream” speech. On October 14, 1964, he won the Nobel Peace Prize for combating racial inequality through nonviolent resistance.


22. “Justice without strength is powerless, strength without justice is tyrannical.”

23. He was an Indian activist who led the Indian independence movement against the British regime. Employing nonviolent civil disobedience, he led India to independence and inspired movements for civil rights and freedom around the world. He was imprisoned for many years, upon many occasions, in both South Africa and India. Anyway, some Indians thought he was too accommodating. Among them was Nathuram Godse, a Hindu nationalist, who assassinated him on 30 January 1948. The honorary title of mahatma (Sanskrit: “great soul”, “venerable”) is used throughout the world.

24. “We are what we think. With our thoughts we create the world.”

25. Martin Luther King Jr. (1929 – 1968)

26. He was a French philosopher, mathematician, and scientist. His “Discourse on Method” (1637) and “Meditations on First Philosophy” (1641) continue to be standard texts at most university philosophy departments. His influence in mathematics is equally apparent; the Cartesian coordinate system was named after him. He is credited as the father of analytical geometry, the bridge between algebra and geometry, used in the discovery of infinitesimal calculus and analysis. He was also one of the key figures in the Scientific Revolution.

27. Voltaire (1694 – 1778)

28. He was a Spanish philosopher, doctor, and natural humanist from Medina del Campo. He proposed the application of empirical methods and he was the first to propose the famous “Cogito ergo sum”, in 1554.

30. He was a French Enlightenment writer, historian and philosopher famous for his wit, his criticism of Christianity, especially the Roman Catholic Church, and his advocacy of freedom of religion, freedom of speech, and separation of church and state. He was a versatile and prolific writer, producing works in almost every literary form, including plays, poems, novels, essays and historical and scientific works. He wrote more than 20,000 letters and more than 2,000 books and pamphlets. He was an outspoken advocate of civil liberties, despite the risk this placed him in under the strict censorship laws of the time. As a satirical polemicist, he frequently made use of his works to criticize intolerance, religious dogma and the French institutions of his day. The famous formula “I disapprove of what you say, but I will defend to the death your right to say it”, wrongly attributed to Voltaire, was in fact used in 1906 by Evelyn Beatrice Hall (English writer) to summarize Voltairian thought.

31. Siddhartha Gautama (563/480 – 483/400 BCE),

32. Gomez Pereira, (1500 – 1567)

33. Blaise Pascal (1623 – 1662)

34. Also known as Buddha, he was a monk mendicant, sage, philosopher who founded and taught Buddhism. The word Buddha means “the awakened one” or “the enlightened one”. Gautama taught a Middle Way between sensual indulgence and the severe asceticism.

35. “When a question raises violently contradictory opinions, one can assure that it belongs to the domain of belief and not to that of knowledge.”

36. And finally, can you find the author of these weird/funny quotes:
   “In theory there is no difference between theory and practice. In practice there is.”
   “When you come to a fork in the road, take it.”
   “Baseball is 90% mental and the other half is physical.”
   “Always go to other people’s funerals, otherwise they will not come to yours.”
   “The future is not what it used to be.”
   “If you don’t know where you are going, you might wind up someplace else.”
   “You would not have won if we had beaten you.”

Exercise 3

Consider the following process that we will implement in Scilab.
- We first choose \( N \) integers between 0 and 9, with \( N > 10 \), so that two integers (at least) are identical. These integers are stored in the array \( r_1 = [r_1(1), r_1(2), \ldots, r_1(N)] \)
- We sort these integers in increasing order with the function \texttt{gsort()} \n- We delete the duplicates. Precisely, we define a function that copy all the different elements of \( r_1 \) in a new array \( r_2 \), as follows.
  - initialization : \( r_2 = [r_1(1)] \)
  - for each other element \( r_1(i) \) of the initial array \( r_1 \) :
    - if \( r_1(i) \) is different from its predecessor, we add this element in the array \( r_2 \) :
      \( r_2 = [r_2, r_1(i)] \)
    - otherwise, we do nothing and go to the next element in the array \( r_1 \)
At the end of this process, the array \( r_2 \) contains all the distinct elements of \( r_1 \) in increasing order.
Complete the following Scilab script.

```scilab
// file S05exo3Duplicates.sce

function r2 = DeleteDuplicates(r1)
    // Delete duplicate integers
    // Input : r1 is an array with increasing integers
    // Output : r2 is the array of the strictly increasing values of r1
    N = length(r1);
    ...
    endfunction

// Choose randomly N (N>10) integers between 0 and 9
N = 15;
rand("uniform")
r = rand(1,N);
r = int(10*r);
disp(r)

// Sort the array in increasing order :
r = ...
disp(r)

// Delete duplicate integers
rr = DeleteDuplicates(r)
disp(rr)
```