Course Name

Homework #1

Due on October 04, 2021

Author 1 Author 2 Author 3

Problem 1

Each problem is wrapped by `\begin{homeworkProblem}` and `\end{homeworkProblem}`.

The counter of problem starts from 1 by default, and it will automatically increase. For non-sequential problems, you can use `\begin{homeworkProblem}[a number]` instead. For example, Problem 1 to 3 are sequential, and the following problem is Problem 10 by using `\begin{homeworkProblem}[10]`.

Here you can write the description of a problem. Then you can use `\solution` to start your solution.

Solution

Write your solution here!

Problem 2

What if the problem requires a proof ?

Proof. Please use `\begin{proof}` and `\end{proof}` to wrap your proof. □

Problem 3

What if a problem has multiple sub-problems ?

(1) This is question 1.

(2) This is question 2.

(3) This is question 3.

Solution of (1)

The solution for question 1.

Solution of (2)

The solution for question 2.

Solution of (3)

The solution for question 3.

If you prefer starting a new problem in a new page, please use `\pagebreak` after finishing this problem.

Problem 4

Notice that the id of problem is 4.

Problem 10

Notice that the id of problem is 10, since we use `\begin{homeworkProblem}[10]` here.

Problem 11

Notice that the id of problem is 11, since the last problem id is 10 and we do not specific a id here.

The following are some useful commands for writing in LaTeX:

Solution

Try citation. For example, thanks Josh Davis for his original works on latex-homework-template project [**?**].

Try inserting a figure here:

Figure 1: image source: https://www.latex-project.org/

Try unordered list. You can modify the circle before each item by using `\item[-]` to '-' or `\item[*]` to '*'

- First line.
- Second line.

Try ordered list. You can modify the types of number by using `\begin{enumerate}[a)]` to 'a), b), c), ...', or using `\begin{enumerate}[i)]` to 'i), ii), iii), ...', or using `\begin{enumerate}[a.]` to 'a., b., c., ...', or using `\begin{enumerate}[i.]` to 'i., ii., iii., ...'.

1. First line.
2. Second line.

Try a table:

	$x \mod 5 = 0$	$x \mod 5 = 1$	$x \mod 5 = 2$	$x \mod 5 = 3$	$x \mod 5 = 4$
$x0$	0	2	4	1	3
$x1$	1	3	0	2	4

s

Problem 12

The following are some useful commands for mathematics in LaTeX.

Solution

Try inline formula $x^2 + y^2 = 1$.

Try single line formula with auto id 1:

$$\int_0^1 f(t)dt = \iint_D g(x,y)dxdy. \tag{1}$$

Try single line formula without auto id:

$$n^2 - \frac{c}{n} + 1 \leq n^2$$

Try multiple lines formula with auto id 2:

$$\begin{aligned} n^2 + n + 1 &\leq n^2 + n^2 + n^2 \\ &= 3n^2 \\ &\leq c \cdot 2n^3 \end{aligned} \tag{2}$$

or

$$n^2 + n + 1 \leq n^2 + n^2 + n^2 \tag{3}$$

$$= 3n^2 \tag{4}$$

$$\leq c \cdot 2n^3 \tag{5}$$

Try multiple lines formula without auto id:

$$\begin{cases} \frac{dS}{dt} = \Lambda - \beta SI - \mu S - \mu_1 mZS + \delta_0 R, \\ \frac{dI}{dt} = \beta SI - (\mu + \delta + \gamma)I. \end{cases}$$

Try bold text in equations:

$$\begin{aligned} &\min_{\boldsymbol{x}} \ \boldsymbol{x}^T A \boldsymbol{x} \\ &s.t. \ \boldsymbol{c}^T \boldsymbol{x} = 0 \end{aligned}$$

Problem 13

The following are some useful commands for algorithms in LaTeX.

Solution

Try an algorithm in pseudo code:

Algorithm 1 Start of QuickSort

Require: *list*
Ensure: a sorted *list*
  function QUICK-SORT($list, start, end$)
    if $start \geq end$ **then**
      return
    end if
    $mid \leftarrow$ PARTITION($list, start, end$)
    QUICK-SORT($list, start, mid - 1$)
    QUICK-SORT($list, mid + 1, end$)
  end function

Try draw a graph:

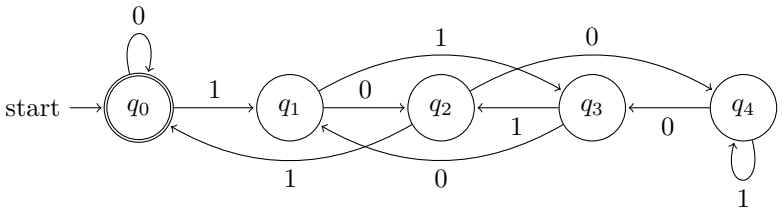

Figure 2: This is really beautiful!

Try some python codes. When the code language is not python, remember to change the coding language option when using `\begin{lstlisting}`:

```
count = 0
while (count < 9):                          # loop every number
    print('The count is:'+str(count))       # print current number
    count = count + 1                       # update number
print("Good bye!")
```

A example of python codes