Programming Language Lab. 6 (A 반)

6.1 Clock system with structure for time

1) Design a structure for time that contains hour, minute, and second.

```
struct Time {
    int     hour;
    int     min;
    int     sec;
};
```

2) Input a date from console terminal in format of three integers for hour, min, and sec. For example, “10 5 30” means 10 O’clock, 5 minute and 30 second. The hour value is in universal format (i.e., from 0 O’clock to 23 O’clock).

3) Write a function that prints out the given time in the format of “hh:mm:ss”, where hh means hour in universal time, mm means minute, and ss means second. The overall range of time can be “00:00:00” ~ “23:59:59”.

4) Write a function that increment the given time by the specified second. The prototype is “void incrementTime(Time &, int)”. Input an integer number, and increase the time initialized in step 2) (by the input integer data). The min and hour must be calculated correctly at the time increment. Use call-by-reference to handle the time delivered in the parameter list. Adding 2 seconds for time “23:59:59” will become “00:00:01”.

5) Write a function “int timeCompare(const Time& t1, const Time& t2)” that compares two times, and returns the difference of the two times’ in seconds. The function receives two arguments of Time variables, passed by call-by-reference. The return type is integer. Using the first time (input from console) and the increased time, calculate the difference of the two times using the timeCompare() function.

6.2 Struct shape and overloaded function surface().

1) Design structures for 2-D shapes and 3-D shapes, including rectangle, ellipse, rectangular pipe, and sphere. Each shape must contain at least following attributes:
   - Rectangle: width, depth
   - Ellipse: majorRadius, minorRadius
   - Rectangular Pipe: width, depth, height
   - Sphere: radius
2) Write a overloaded function surface() that receives the 2-D shape or 3-D shape as parameter, and calculates the surface of the given shape. So, there must be following overloaded functions:
   - double surface(const Rectangle r);
   - double surface(const Ellipse e);
   - double surface(const RectangularPipe rp);
   - double surface(const Sphere sp);
3) In main() function, instantiate shapes of rectangle, ellipse, rectangular pipe, and sphere. Write a command-driven program that inputs the type of shape, its attributes from standard console input, calculates the surface of the given shape, and print outs the calculated surface.