Effective and Modern C++ Programming

Lab 3 – Functional objects

Exercise 1. Function Pointers

Change the file function_pointers.cpp so that it will compile with -std=c++03 flag.
Replace auto and decltype with appropriate function pointers.

Exercise 2. Lambda Expressions

Implement lambda expressions in the lines denoted by // (n) in the file lamba.cpp:

(1) Function that compares two elements a and b:
a<b iff a is closer to center than b.

(2) Function that compares according to Sharkowski ordering
http://www.scholarpedia.org/article/Sharkovsky_ordering

(3) Function without parameters that return random integer number from interval [a, b] (a and b both included). Changing values of a or b should change the interval used by generator.
Use `std::rand` to generate random integer.

(4) Function that generates a random even integer from interval [a, b]. The further changes of the a or b value do not change the behaviour of a closure.

(5) Function that for given standard container (vector, list, deque) computes l_1 norm i.e. the sum of the absolute values of elements in the container.
Try to use std::accumulate algorithm with another lambda expression to implement it.

(6) Function that for given array a and integer n returns a function with one parameter x that computes a value of a polynomial of degree n with coefficients a at the point x.

Exercise 3. Function Objects (Functors)

Implement class Printer that will have the following functionality:

```
Printer print(std::cout,  "[", "]" );   // creates unary functor
                                        //that takes argument x of any type
                                        // and prints [ x ]
print("hello");    // [ hello ]
std::vector<int> v = {1, 2, 3, 4};
std::for_each(v.begin(), v.end(), print);  // [ 1 ] [ 2 ] [ 3 ] [ 4 ]

std::ofstream file("myFile.txt");
Printer filePrinter(file, "- ", "\n");
filePrinter(5);
filePrinter("My text");
/** myFile.txt
- 5
- My text
*/
```