```c
/*************************************************************************/
/*                                                                       */
/*    A sample solution for labwork 3.                                   */
/*                                                                       */
/*                                                                       */
/*************************************************************************/

/* Include libraries */
#include <stdio.h>

/* Macro definition for minimum and maximum grades */
#define MIN_GRADE 0
#define MAX_GRADE 100

/* Macro definition for error codes */
/* You can think this part as an error code book */
#define ERROR_CODE_FOR_INVALID_NUMBER_OF_EXAMS -1
#define ERROR_CODE_FOR_INVALID_GRADE -2
#define ERROR_CODE_FOR_INVALID_LETTER_CODE 'X'


/* Function Declerations */
char gradeToLetterCode(double grade);      /* Converts a grade to a letter code */

int main()
{
	/* Variable declarations */
	int numberOfExams = 0;
	int grade1 = 0, grade2 = 0, grade3 = 0, grade4 = 0, grade5 = 0;
	/* Initialize all the grades with a zero. Why? */
	/* It is a simple trick, please check line number 109 */

	double avgGrade;

	char letterCode;


	/* Getting User Inputs */

	/* Ask for the number of exams and check it */
	printf("Number of exams: ");
	scanf("%d", &numberOfExams);

	/* Is it a valid number of exams? */
	if (numberOfExams < 1 ||numberOfExams > 5)
	{
		printf("An invalid number of exams is entered!\n");
		return ERROR_CODE_FOR_INVALID_NUMBER_OF_EXAMS;
		/*A problem can easily be determined by using these codes and a code book*/
	}

	/* Ask for the first grade and check it */
	if (numberOfExams>=1)  {
		printf("Grade-1: ");
		scanf("%d", &grade1);
	}

	if (grade1 < MIN_GRADE || grade1 > MAX_GRADE)  {
		printf("An invalid grade is entered!\n");
		return ERROR_CODE_FOR_INVALID_GRADE;
	}

	/* Ask for the second grade and check it */
	if (numberOfExams>=2)  {
```

```
65                printf("Grade-2: ");
66                scanf("%d", &grade2);
67          }
68
69          if (grade2 < MIN_GRADE || grade2 > MAX_GRADE)   {
70                printf("An invalid grade is entered!\n");
71                return ERROR_CODE_FOR_INVALID_GRADE;
72          }
73
74          /* Ask for the third grade and check it */
75          if (numberOfExams>=3)  {
76                printf("Grade-3: ");
77                scanf("%d", &grade3);
78          }
79
80          if (grade3 < MIN_GRADE || grade3 > MAX_GRADE)   {
81                printf("An invalid grade is entered!\n");
82                return ERROR_CODE_FOR_INVALID_GRADE;
83          }
84
85          /* Ask for the fourth grade and check it */
86          if (numberOfExams>=4)  {
87                printf("Grade-4: ");
88                scanf("%d", &grade4);
89          }
90
91          if (grade4 < MIN_GRADE || grade4 > MAX_GRADE)   {
92                printf("An invalid grade is entered!\n");
93                return ERROR_CODE_FOR_INVALID_GRADE;
94          }
95
96          /* Ask for the fifth grade and check it */
97          if (numberOfExams>=5)  {
98                printf("Grade-5: ");
99                scanf("%d", &grade5);
100         }
101
102         if (grade5 < MIN_GRADE || grade5 > MAX_GRADE)   {
103               printf("An invalid grade is entered!\n");
104               return ERROR_CODE_FOR_INVALID_GRADE;
105         }
106
107         /* Compute averageGrade. */
108         avgGrade =
109               (double)(grade1 + grade2 + grade3 +  grade4 + grade5) / numberOfExams;
110         /* It is guaranteed that the numberOfExams cannot be equal to zero.  */
111
112         /*Compute the letter code by calling our user defined function gradeToLetter()*/
113         letterCode =  gradeToLetterCode(avgGrade);
114
115         /* Print the average grade and its corresponding letter code */
116         printf("Your average grade is %6.2f.\n", avgGrade);
117
118         if (letterCode == ERROR_CODE_FOR_INVALID_LETTER_CODE)
119               printf("An invalid average grade is sent to gradeToLetterFunction\n");
120         else
121               printf("Your letter code is %c.\n", letterCode);
122
123         return 0;      /* return 0 indicates that everything is okey */
124   }
125
126
127   /* Converts a double grade to letter code and returns the code as a char */
128   char gradeToLetterCode(double grade)
```

```
129 {
130         /* Is it a valid grade?
131            We check it again here beacuse this user defined function
132            can be used in another program which has no input validation */
133         if (grade > MAX_GRADE || grade < MIN_GRADE)
134             return ERROR_CODE_FOR_INVALID_LETTER_CODE;
135 
136 
137         /* You can also have macro definations for 99.5, 79.5, ...  */
138 
139         /* Do not check a double value with == or != */
140         if ( grade >= 99.5)     /*A round up here. We accept 99.5 and above as an A.*/
141             return 'A';
142 
143         if (grade >= 79.5)
144             return 'B';
145 
146         if (grade >= 49.5)
147             return 'C';
148 
149         if (grade >= 19.5)
150             return 'D';
151 
152         if (grade >= 0.5)
153             return 'E';
154 
155         return 'F';
156 }
```