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Question One
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/* File: a5.1.c (sumcubes.c)

   Programmer: Alex Moriarty            Date: Oct 23
   Course: ENGM 2081                    Instructor: Fenton/Phillips

   This functions computes the sum of the cubes of numbers read from
   a file a5.1.in .
*/



#include<stdio.h>
#include<stdlib.h>

int main(void){

        float num, sum = 0;
        FILE *fin = fopen("a5.1.in","r");
        int count = 0;

        while(fscanf(fin,"%f", &num) != EOF ){
                sum += num*num*num;
                count++;
        }

        printf("\n%d floats were read\nthe sum of cubes is %.3f\n",count,sum);

}
::::
Question Two
::::
/* File: a5.2.c (vowels.c)

   Programmer: Alex Moriarty        Date: Oct 23
   Course: engm2081                 Instructors: Fenton/Phillips

   This program counts the number times each of the of the vowels
   occurs in a file. and prints a horizontal line graph.
*/


#include<stdio.h>
#include<stdlib.h>

void print_astrix(int n, FILE *fout)

/*
        NOTE: Program Expects Input from a file named a5.2.in !
*/
int main(void){

        int a=0, e=0, i=0, o=0, u=0;
        char ch;
        FILE *fout=fopen("a5.2.out","w");
        FILE *fin=fopen("a5.2.in","r");

        while( fscanf(fin,"%c",&ch) != EOF ){
                if(ch == 'A' || ch == 'a')
                        a++;
                else if(ch =='E' || ch == 'e')
                        e++;
                else if(ch =='I' || ch == 'i')
                        i++;
                else if(ch =='O' || ch == 'o')
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                        o++;
                else if(ch =='U' || ch == 'u')
                        u++;
        }

        fprintf(fout,"a:");
        print_astrix(a, fout);
        fprintf(fout,"e:");
        print_astrix(e, fout);
        fprintf(fout,"i:");
        print_astrix(i, fout);
        fprintf(fout,"o:");
        print_astrix(o, fout);
        fprintf(fout,"u:");
        print_astrix(u, fout);

        return 1;

}

void print_astrix(int n, FILE *fout){
        fprintf(fout," %d: ", n);
        int z;
        for(z=0; z<n; z++){
                 fprintf(fout,"*");
        }
        fprintf(fout,"\n");
}
::::
Question Three
::::
/* File: a5.3.c (cables.c)

   Programmer: Alex Moriarty         Date: Oct 23
   Course: ENGM 2081                 Instructor: Fenton/Phillips
*/

#include<stdio.h>
#include<stdlib.h>
#include<string.h>

int main(void){

        int length, quantity;
        char type = 'g', S[9];
        float total=0.0, cost;

        do
        {
                printf("Enter store code and quantity: ");
                scanf("%c",&type);
                if((type != 'q' || type != 'Q') && (type == 'u' || type == 'U' || type == 'e' || type ==
'E'))
                {

                        scanf("%d%d",&length,&quantity);

                        if(type == 'u' || type == 'U')
                        {
                                strcpy(S, "USB");
                                if(length == 6)
                                {
                                        cost = quantity*24.0;
                                        total += cost;
                                        goto PRINT_STATEMENT;
                                }else if(length == 10)
                                {
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                                        cost = quantity*36.0;
                                        total += cost;
                                        goto PRINT_STATEMENT;
                                }else
                                {
                                        printf("\tInvalid Input (Length)\n");
                                        goto END_LOOP;
                                }
                        }else if( type == 'e' || type == 'E')
                        {
                                strcpy(S, "Ethernet");
                                if(length == 25)
                                {
                                        cost = quantity*18.0;
                                        total += cost;
                                        goto PRINT_STATEMENT;
                                }else if(length == 50)
                                {
                                        cost = quantity*30.0;
                                        total += cost;
                                        goto PRINT_STATEMENT;
                                }else
                                {
                                        printf("\tInvalid Input (Length)\n");
                                        goto END_LOOP;
                                }
                        }
                        PRINT_STATEMENT:
                        printf("%d %s cables (%d foot) costs $%.2f (total = $%.2f)\n", quantity, S,
length, cost, total);
                        goto END_LOOP;
                }else if(type == 'q' || type == 'Q'){
                        break;
                }else
                        printf("\tInvalid Input (Type)\n");

                END_LOOP:
                        while (getchar() != '\n');

        }while(type != 'q' || type != 'Q');

        return 0;
}
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Question Four
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/* File: a5.4.c (lumber.c)

   Programmer: Alex Moriarty         Date: Oct 23
   Course: ENGM2081                  Instructor: Fenton/Phillips

   This program prints out a table of engineering properties of various
   sizes of lumber
*/

#include <stdio.h>
#include <math.h>

float cross_sectional_area(int base, int height);
float moment_of_inertia(int base, int height);
float section_modulus(int base, int height);

int main(void){

        int b, h;
        float crossArea, inertia, modulus;
        FILE *fout = fopen("a5.4.out","w");
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        fprintf(fout,"Lumber Size     Cross sectional     Moment of       Section\n
Area             Inertia         Modulus\n-------------------------------------------------------------\n");

        for(b=2;b<=10;b+=2){
                for(h=2;h<=12;h+=2){
                        crossArea = cross_sectional_area(b,h);
                        inertia = moment_of_inertia(b,h);
                        modulus = section_modulus(b,h);

                        fprintf(fout, "%2d x %2d %16.2f %16.2f %16.2f\n", b, h,  crossArea, inertia,
modulus);
                }
        }
}

float cross_sectional_area(int base, int height){
        return base*height*1.0;
}

float moment_of_inertia(int base, int height){
        return (base*pow(height,3))/12.0 ;
}

float section_modulus(int base, int height){
        return (base*pow(height,2))/6.0 ;
}
```