1. Write a program that outputs the equation of the perpendicular bisector of the line segment between two points.
   Your program should • prompt for and input the coordinates of the two points [for example, try the points (2.0,-4.0) and (7.0,-2.0)]; • compute the slope of the line between those two points; • compute the coordinates of the midpoint of the line segment between the two points by aver aging the two x coordinates and the two y coordinates; • compute the slope of the perpendicular bisector by taking the negative reciprocal of the slope of the line segment; • compute the y intercept of the perpendicular bisector (you now have the slope m of the bisector and a point (xmid , ymid) on the bisector, so the y intercept is ymid- m xmid); and • output with labels the original two points, and output in y = mx + b format the equation of the perpendicular bisector. The below mentioned Figure illustrates the sample line segment mentioned above and its perpendicular bisector.
   Implementation:

```
#include <stdio.h>

int main() {
   double x1, y1, x2, y2;
   printf("Enter the coordinates of the first point (x1, y1): ");
   scanf("%lf %lf", &x1, &y1);
   printf("Enter the coordinates of the second point (x2, y2): ");
   scanf("%lf %lf", &x2, &y2);

   if (x1 == x2 && y1 == y2) {
      printf("The points are identical; the perpendicular bisector is undefined.\n");
      return 1;
   }

   double xmid = (x1 + x2) / 2;
   double ymid = (y1 + y2) / 2;
   double slope = (x2 - x1 != 0) ? (y2 - y1) / (x2 - x1) : 0;
   double perpendicular_slope = -1 / slope;
   double intercept = ymid - (perpendicular_slope * xmid);

   printf("The original points are: (%.2f, %.2f) and (%.2f, %.2f)\n", x1, y1, x2, y2);
   printf("The equation of the perpendicular bisector is: y = %.2fx + %.2f\n",
perpendicular_slope, intercept);

   return 0;
}
```

2. Chatflow Wireless offers customers 600 weekday minutes for a flat rate of 39.99. Night (8 P.M. to 7 A.M.) and weekend minutes are free, but additional weekday minutes cost 0.40 each. There are taxes of 5.25% on all charges. Write a program that prompts the user to enter the number of weekday minutes, night minutes, and weekend minutes used, and calculates the monthly bill

and average cost of a minute before taxes. The program should display with labels all the input data, the pretax bill and average minute cost, the taxes, and the total bill

Implementation:

```
#include <stdio.h>

int main() {
   int weekday_minutes, night_minutes, weekend_minutes;
   double flat_rate = 39.99;
   double additional_rate = 0.40;
   double tax_rate = 0.0525;
   double total_bill, pretax_bill, taxes;
   double average_minute_cost;

   printf("Enter the number of weekday minutes used: ");
   scanf("%d", &weekday_minutes);
   printf("Enter the number of night minutes used: ");
   scanf("%d", &night_minutes);
   printf("Enter the number of weekend minutes used: ");
   scanf("%d", &weekend_minutes);

   if (weekday_minutes > 600) {
      pretax_bill = flat_rate + (weekday_minutes - 600) * additional_rate;
   } else {
      pretax_bill = flat_rate;
   }

   taxes = pretax_bill * tax_rate;
   total_bill = pretax_bill + taxes;
   average_minute_cost = pretax_bill / (weekday_minutes + night_minutes + weekend_minutes);

   printf("Weekday minutes: %d\n", weekday_minutes);
   printf("Night minutes: %d\n", night_minutes);
   printf("Weekend minutes: %d\n", weekend_minutes);
   printf("Pretax bill: $%.2f\n", pretax_bill);
   printf("Average cost per minute before taxes: $%.2f\n", average_minute_cost);
   printf("Taxes: $%.2f\n", taxes);
   printf("Total bill: $%.2f\n", total_bill);

   return 0;
}
```