**SFWRENG 2MP3 – Programming for Mechatronics - Fall 2018**

Note: For each question, paste your code and the screenshot of compilation & execution steps.

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| **Exercise 2 Solution** | | Submitted By**: HARNEET SINGH, #400110275,** [**singhh76@mcmaster.ca**](mailto:singhh76@mcmaster.ca) |
| Question # | Answer | |
| #1 - a | #include <stdio.h>  void main ()  {  int rows, i, j, k, dash;  printf("This program displays a diamond pattern with user defining the number of rows: \n");  printf("Please an interger between 1 and 10 to create a pattern: ");  scanf("%d", &rows);  dash = rows - 1;  for (i = 1; i<=rows; i++) {  for (j = 1; j <= dash; j++)  printf(" ");  dash--;  for (k = 1; k <= (2\*i)-1; k++) {  printf("\*");}  printf("\n");  }  dash = 1;  for (i = 1; i<rows; i++){  for (j=1; j<=dash; j++)  printf(" ");  dash++;  for (k = 1; k<= ((2\*(rows-i))-1); k++)  printf("\*");  printf("\n");  }  } | |
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| #1 – b | #include <stdio.h>  void main ()  {  int rows, dash;  printf("This program displays a diamond pattern with user defining the number of rows: \n");  printf("Please an interger between 1 and 10 to create a pattern: ");  scanf("%d", &rows);  int i = 1;  dash = rows - 1;  do {  int j = 1;  if (i == rows)  { do {  break;  printf(" ");  } while (++j <= dash);  }  else {  do {  printf(" ");  } while (++j <= dash);  }  dash--;  int k = 1;  do {  printf("\*");  } while (++k<=(2\*i)-1);  printf("\n");  } while (++i <= rows);  int s = 1;  dash = 1;  do {  int f = 1;  do {  printf(" ");  } while (++f <= dash);  dash++;  int g = 1;  do {  printf("\*");  } while (++g <= (2\*(rows-s))-1);  printf("\n");  } while (++s < rows);  } | |
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| #2 | #include <stdio.h>  #include <math.h>  void main ()  {  float a, b, c;  double root\_1, root\_2;  int x;  printf("This program will calculate roots of ax+by+c=0 equation within required precision\n");    printf("Please enter an a value: ");  scanf("%f", &a);  printf("Please enter a b value: ");  scanf("%f", &b);  printf("Please enter a c value: ");  scanf("%f", &c);  printf("Please enter an integer value of the number of decimal places: ");  scanf("%d", &x);  root\_1 = (-b + sqrt((b\*b) - 4\*a\*c))/(2\*a);  root\_2 = (-b - sqrt((b\*b) - 4\*a\*c))/(2\*a);    printf("The first root is located at %\*.\*lf ", 0, x, root\_1);  printf("and the second root is located at %\*.\*lf\n", 0, x, root\_2);  } | |
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| #3 - a | #include <stdio.h>  #include <math.h>  void main ()  {  double value;  printf("This program coverts a 12 point grade scale to a 4 point grade scale\n");  printf("Please enter the GPA to be converted: ");  scanf("%lf", &value);  double GPA12 = roundf(value\*10) / 10;  if (10.9 <= GPA12 && GPA12<= 12.0) {  printf("4.0\n");}  else if (10.6 <= GPA12 && GPA12<= 10.8) {  printf("3.9\n");}  else if (10.3 <= GPA12 && GPA12 <= 10.5) {  printf("3.8\n");}  else if (10.0 <= GPA12 && GPA12 <= 10.2) {  printf("3.7\n");}  else if (9.7 <= GPA12 && GPA12 <= 9.9) {  printf("3.6\n");}  else if (9.4 <= GPA12 && GPA12 <= 9.6) {  printf("3.5\n");}  else if (9.1 <= GPA12 && GPA12 <= 9.3) {  printf("3.4\n");}  else if (8.8 <= GPA12 && GPA12 <= 9.0) {  printf("3.3\n");}  else if (8.5 <= GPA12 && GPA12 <= 8.7) {  printf("3.2\n");}  else if (8.2 <= GPA12 && GPA12<= 8.4) {  printf("3.1\n");}  else if (7.9 <= GPA12 && GPA12 <= 8.1) {  printf("3.0\n");}  else if (7.6 <= GPA12 && GPA12<= 7.8) {  printf("2.9\n");}  else if (7.3 <= GPA12 && GPA12 <= 7.5) {  printf("2.8\n");}  else if (7.0 <= GPA12 && GPA12 <= 7.2) {  printf("2.7\n");}  else if (6.7 <= GPA12 && GPA12 <= 6.9) {  printf("2.6\n");}  else if (6.4 <= GPA12 && GPA12 <= 6.6) {  printf("2.5\n");}  else if (6.1 <= GPA12 && GPA12 <= 6.3) {  printf("2.4\n");}  else if (5.8 <= GPA12 && GPA12 <= 6.0) {  printf("2.3\n");}  else if (5.5 <= GPA12 && GPA12 <= 5.7) {  printf("2.2\n");}  else if (5.2 <= GPA12 && GPA12 <= 5.4) {  printf("2.1\n");}  else if (4.9 <= GPA12 && GPA12 <= 5.1) {  printf("2.0\n");}  else if (4.6 <= GPA12 && GPA12 <= 4.8) {  printf("1.9\n");}  else if (4.3 <= GPA12 && GPA12 <= 4.5) {  printf("1.8\n");}  else if (4.0 <= GPA12 && GPA12 <= 4.2) {  printf("1.7\n");}  else if (3.7 <= GPA12 && GPA12 <= 3.9) {  printf("1.6\n");}  else if (3.4 <= GPA12 && GPA12 <= 3.6) {  printf("1.5\n");}  else if (3.1 <= GPA12 && GPA12 <= 3.3) {  printf("1.4\n");}  else if (2.8 <= GPA12 && GPA12 <= 3.0) {  printf("1.3\n");}  else if (2.5 <= GPA12 && GPA12 <= 2.7) {  printf("1.2\n");}  else if (2.2 <= GPA12 && GPA12 <= 2.4) {  printf("1.1\n");}  else if (1.8 <= GPA12 && GPA12 <= 2.1) {  printf("1.0\n");}  else if (1.5 <= GPA12 && GPA12 <= 1.7) {  printf("0.9\n");}  else if (1.3 <= GPA12 && GPA12 <= 1.5) {  printf("0.8\n");}  else if (1.0 <= GPA12 && GPA12 <= 1.2) {  printf("0.7\n");}  else if (GPA12 == 0.9) {  printf("0.6\n");}  else if (0.7 <= GPA12 && GPA12 <= 0.8) {  printf("0.5\n");}  else if (GPA12 == 0.6) {  printf("0.4\n");}  else if (0.4 <= GPA12 && GPA12 <= 0.5) {  printf("0.3\n");}  else if (GPA12 == 0.3) {  printf("0.2\n");}  else if (0.1 <= GPA12 && GPA12 <= 0.2) {  printf("0.1\n");}  else if (GPA12 == 0.0) {  printf("0.0\n");}  else {printf("Please enter a valid GPA\n");}  } | |
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| #3 - b | #include <stdio.h>  void main ()  {  double value;  printf("This program coverts a 12 point grade scale to a 4 point grade scale\n");  printf("Please enter the GPA to be converted: ");  scanf("%lf", &value);  int GPA\_12 = value\*100/10;  switch (GPA\_12) {  case 120:  case 119:  case 118:  case 117:  case 116:  case 115:  case 114:  case 113:  case 112:  case 111:  case 110:  case 109:  printf("4.0\n");  break;  case 108:  case 107:  case 106:  printf("3.9\n");  break;  case 105:  case 104:  case 103:  printf("3.8\n");  break;  case 102:  case 101:  case 100:  printf("3.7\n");  break;  case 99:  case 98:  case 97:  printf("3.6\n");  break;  case 96:  case 95:  case 94:  printf("3.5\n");  break;  case 93:  case 92:  case 91:  printf("3.4\n");  break;  case 90:  case 89:  case 88:  printf("3.3\n");  break;  case 87:  case 86:  case 85:  printf("3.2\n");  break;  case 84:  case 83:  case 82:  printf("3.1\n");  break;  case 81:  case 80:  case 79:  printf("3.0\n");  break;  case 78:  case 77:  case 76:  printf("2.9\n");  break;  case 75:  case 74:  case 73:  printf("2.8\n");  break;  case 72:  case 71:  case 70:  printf("2.7\n");  break;  case 69:  case 68:  case 67:  printf("2.6\n");  break;  case 66:  case 65:  case 64:  printf("2.5\n");  break;  case 63:  case 62:  case 61:  printf("2.4\n");  break;  case 60:  case 59:  case 58:  printf("2.3\n");  break;  case 57:  case 56:  case 55:  printf("2.2\n");  break;  case 54:  case 53:  case 52:  printf("2.1\n");  break;  case 51:  case 50:  case 49:  printf("2.0\n");  break;  case 48:  case 47:  case 46:  printf("1.9\n");  break;  case 45:  case 44:  case 43:  printf("1.8\n");  break;  case 42:  case 41:  case 40:  printf("1.7\n");  break;  case 39:  case 38:  case 37:  printf("1.6\n");  break;  case 36:  case 35:  case 34:  printf("1.5\n");  break;  case 33:  case 32:  case 31:  printf("1.4\n");  break;  case 30:  case 29:  case 28:  printf("1.3\n");  break;  case 27:  case 26:  case 25:  printf("1.2\n");  break;  case 24:  case 23:  case 22:  printf("1.1\n");  break;  case 21:  case 20:  case 19:  case 18:  printf("1.0\n");  break;  case 17:  case 16:  printf("0.9\n");  break;  case 15:  case 14:  case 13:  printf("0.8\n");  break;  case 12:  case 11:  case 10:  printf("0.7\n");  break;  case 9:  printf("0.6\n");  break;  case 8:  case 7:  printf("0.5\n");  break;  case 6:  printf("0.4\n");  break;  case 5:  case 4:  printf("0.3\n");  break;  case 3:  printf("0.2\n");  break;  case 2:  case 1:  printf("0.1\n");  break;  case 0:  printf("0.0\n");  break;  default:  puts("Please enter a valid number");  break;  }  } | |
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