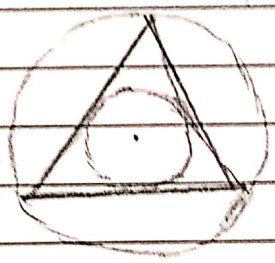
Assignment NO. 2 A(2) DATE:

Problem Statement:
Write a C++ program to draw inscribed and circumscribed circle in the triangle as shown in example use Bresenham's algorithm circle drawing for outer circle and DDA algorithm for inner circle and use any algorithm to draw a triangle.



Learning outcome:
- Ability to understand different circle drawing algorithm.
- Able to understand different equation of line and circle.

learning objective:
To draw the above fig. using DDA circle and Bresenham's circle drawing algorithm.

Software and hardware requirements:
- Fedora 20
- qtCreator

Concept related theory:
Bresenham's circle drawing algorithm:
1. Read center (x_1, y_1) & radius r
2. $x_1 = 0$, $y_1 = r$ $p = 3 - 2r$
3. while $(x_1 \leq y_1)$

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Draw():
If (p<0)
p = p + 4(x1+1) + 6
else
p = p + 4(x1 - y1) + 10
y1 = y1 - 1;
x1 = x1 + 1
4. END

Draw()
setpixel (xc+x1, yc+y1, color)
setpixel (xc+x1, yc-y1, color)
setpixel (xc-x1, yc-y1, color)
setpixel (xc-x1, yc+y1, color)
setpixel (xc+y1, yc+x1, color)
setpixel (xc-y1, yc+x1, color)
setpixel (xc+y1, yc-x1, color)
setpixel (xc-y1, yc-x1, color)
~~setpixel~~

* Advantages:-
- The algorithm is based on equation of circle.
- Easy to implement.

* Disadvantages:-
- Accuracy is an issue.

DDA circle drawing algorithm:
1. Read center (xc, yc) & radius.

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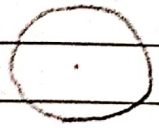
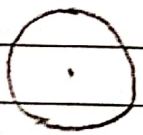
2. $x_1 = r$, $y_1 = 0$
3. $Sx = x$, $Sy = y$
4. $e = 1.0 / r$
5. do
   $x_2 = x_1 + e * y_1$
   $y_2 = y_1 - e * x_2$
   setpixel ($x_c + x_2$, $y_c - y_2$, color)
   $x_1 = x_2$
   $y_1 = y_2$
   while ((($y_1 - Sy$) < e) || (($Sx - x_1$) > e))
6. END

Advantages:
- It is simple algorithm
- It does not require special skills implementation.

Disadvantages
- Because of round off values, error is introduced.

Test cases:

	Input	Expected o/p	Actual o/p	Result
1)	$x_c = 200$ $y_c = 200$ $r = 100$			Pass
2)	$x_c = 586$ $y_c = 586$ $r = 200$	Out of Range	Out of Range	Pass
3)	$x_c = 200$ $y_c = 200$ $r = 50$			Pass

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Conclusion:

DDA circle algorithm and bresenhams circle algorithm was implemented to draw the required figure and implemented the concept of circle drawing algorithm.