CMPSC 201 Practice Final Exam **NAME - _____**

Program 13.1 Fill-In-The-Blank

Write the correct variable, expression and/or syntax for each numbered "gap" in the following program. This program is Program 13.1 from the Bronson textbook with the comments removed. You may write on this page as scratch work but only the answers on the attached paper will be graded.

```
#include <iostream.h>
#include <math.h>

void bisection(double, double, double, int);
double f(          1          );

int main()
{
 int imax;
 double a, b;
 double epsilon;

 cout << "Enter the limits of the original search interval, a and b: ";
 cin  >> a >> b;
 cout << "Enter the convergence criteria: ";
 cin  >> epsilon;
 cout << "Enter the maximum number of iterations allowed: ";
 cin  >> imax;

 bisection(              2          );

 return 0;
}

void bisection(double a, double b, double epsilon, int imax)
{
 int i;
 double x1, x2, x3;
 double f1, f2, f3;
 double width;
 double curwidth;

 cout << "\nThe original search interval is from " << a << " to " << b << endl;
 cout << "The convergence criterion is: interval < "  <<       3          << endl;
 cout << "The maximum number of iterations allowed is " << imax << endl;

 x1 = a;
 x3 =          4          ;
 f1 = f(x1) ;
 f3 = f(x3);
 width = (          5          );

 if (f1 * f3 >       6          )
   cout << "\nNo root in the original interval exists" << endl;
 else
 {
```

```
   for (i = 1; i <=    7      ; i++)
   {
    x2 = (x1 + x3) / 2.0;
    f2 = f(x2);
    if (f1 * f2 <= 0.0)
    {
     curwidth = (x2 - x1) / 2.0;
     f3 = f2;
     x3 =x2;
    }
    else
    {
     curwidth = (        8          ) / 2.0;
     f1 = f2;
     x1 = x2;
    }
    if (curwidth < epsilon)
    {
     cout << "\nA root at x = " << x2 << " was found "
          << "in " << i << " iterations" << endl;
     cout << "The value of the function is " << f2 << endl;
     return;
    }
   }
  }
  cout << "\nAfter " << imax << " iterations, no root was found "
       << "within the convergence criterion" << endl;

  return;
}

 double f(double x)
{
       const double PI = acos(-1);

       return (exp(-x) - sin(0.5 * PI * x));
}
```

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Write the answers to the Program 13.1 Fill-In-The-Blank section here:

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

11. _____

12. _____

13. _____