Quiz 5 solutions and explanations

IMPORTANT: Even if you do not intend/need to look through the solutions to Quiz 5, you still need to mark this quiz as completed using the blue "Mark as Completed" button in the lower right of this page. By doing so, you will unlock Assignment 5!

This document is meant to provide clear explanations for the Quiz 5 questions (not the in-video quizzes since they have explanations already). I do NOT provide feedback during the quiz (like I do for the screencasts) because a learner could just guess, obtain the correct answers, then put them back into the quiz and get 100%!

This document is purely for you to learn more and to correct your misconceptions about the material. If you view this document soon after you take the quiz to see why you missed a certain question, it will serve as a great learning tool!

PLEASE DO NOT SHARE THIS DOCUMENT WITH ANYONE! Using this document to complete Quiz 5 is a violation of Coursera's Honor Code (a.k.a. cheating).

Question 1:

Which of the following statements are true regarding the content that you learned about in this module?

A. Circular calculations are inherently live when set up correctly in Excel.

Correct! All Excel formulas are "live", meaning that if anything on the spreadsheet is modified, all calculations are re-evaluated (NOTE: this is the default setting in Excel – if this is not happening then go to File □ Options □ Formulas □ "Workbook Calculation" in "Calculation Options" and make sure that "Automatic" is selected). So, since circular calculations are based on Excel formulas, it is a live solution!

B. The bisection method and the Golden Search method can both be utilized to find the zeros of a function.

Incorrect. The Golden Search method is used to find the minimum (or maximum) of a function.

C. The bisection method and iterative solving can both be utilized to find the zeros of a function.

Correct! These two tools can be used to find the zero(s) of a function.

D. One of the main limitations of the Goal Seek tool is that it cannot be automated in VBA.

Incorrect. The Goal Seek tool *can* be automated. However, it is not a live solution so if the inputs are changed then the user must re-run the Goal Seek tool.

E. A disadvantage of using a circular calculation in Excel is that if you are providing something to a client or coworker, iterative calculations must be enabled and the user may not know how to enable them.

Correct! The user must enable iterative calculations, and this can be confusing to others who are not familiar with it.

Question 2:

The subroutine below calculates the minimum of the funky function between x = 0 and x = 4. What VBA code is required in the "< What goes here? >" line in order for it to work properly? There is additional code required in the "< Something else goes here >" space, but this question is only asking for the former (first blank line).

```
Option Explicit
```

```
Sub GoldenSearch()
Dim i As Integer, a As Double, b As Double
Dim GR As Double, d As Double, x1 As Double, x2 As Double
Dim fx1 As Double, fx2 As Double
GR = (Sqr(5) - 1) / 2
a = 0
b = 4
For i = 1 To 20
    d = GR * (b - a)
    x1 = a + d
    x2 = b - d
    fx1 = funky(x1)
    fx2 = funky(x2)
    If fx1 > fx2 Then
        < What goes here? >
    Else
        < Something else goes here >
    End If
Next i
MsgBox (x1 + x2) / 2
End Sub
```

```
Function funky(x As Double) As Double
funky = Exp(-0.5 * x) * Cos(2 * x)
End Function
```

Answer: “b = x1” goes into the “What goes here?” slot. If fx1 > fx2, we would want to eliminate everything to the right of x1, so we would redefine b as the old x1. See figures in the screencasts if you are unclear on this.

Question 3:

Solve the following equation using a circular calculation. Enter the solution rounded to the nearest hundredths place. HINT: The solution is between 2 and 3.

$$x^3 \cdot \ln(x) - 2x^2 - 1 = 0$$

Answer: 2.44. Here is a table for solving this.

x = ((1+2*x^2)/ln(x))^(1/3)	
x	f(x)
2	2.350385
2.350385	2.415804
2.415804	2.431025
2.431025	2.434658
2.434658	2.43553
2.43553	2.43574
2.43574	2.43579
2.43579	2.435803
2.435803	2.435805
2.435805	2.435806

Question 4:

Which of the following statements are true regarding the content that you learned about in this module?

A. One main disadvantage of the bisection method is that it can only be used to find positive roots of a function.

Incorrect. The bisection method can solve for both negative and positive roots.

B. One main advantage of automating the Goal Seek tool in VBA is that it is a live solution.

Incorrect. The Goal Seek tool is not a live solution! If the inputs change, the Goal Seek tool must be re-run.

C. If set up properly, Excel can be used to find the roots of multiple (vector of different parameters) scenarios (case study) by implementing a live solution.

Correct! Yes, as shown in some of the screencasts, we can quickly perform case studies on different inputs by creating one-way or two-way data tables.

D. If set up properly, Excel can be used to find the minima or maxima of multiple (vector of different parameters) scenarios (case study) by implementing a live solution.

Correct! Yes, we can implement the Golden Search technique to solve for the minima or maxima when we have vectors of inputs.

E. The Goal Seek and Solver tools can be used to solve targeting and optimization problems in Excel.

Incorrect. The Goal Seek tool cannot be used to solve optimization (minimization and maximization) problems.

Question 5:

The bisection method is being used to calculate the zero of the following function between x = 0 and x = 1.

$$f(x) = e^{-0.5x} \cdot \cos(2x)$$

What is the midpoint for the 3rd iteration? (The midpoint for the 1st iteration is 0.5.) Provide your answer rounded to the thousandths place.

Answer: See below, where I work through 3 iterations of the bisection method in Excel.

$$f(x) = e^{-0.5x} \cdot \cos(2x)$$

iteration	low	flow	mid	fmid	high	fhigh
1	0	1	0.5	0.420788	1	-0.25241
2	0.5	0.420788	0.75	0.048617	1	-0.25241
3	0.75	0.048617	0.875	-0.11508	1	-0.25241

The midpoint of the 3rd iteration is **0.875**.