College of Engineering and Computer Science
Mechanical Engineering Department

California State University Northridge

Mechanical Engineering 309
Numerical Analysis of Engineering Systems

Spring 2014 Number: 15237 Instructor: Larry Caretto

First Quiz, February 5, 2014 (30 minutes)

1. Write the statements required to write VBA function code to compute the integral shown in the equations to the right. Use the following header for your function:

```
Function myInt (a as Double, b as Double, _
                n as Double) as Variant
```

$$\int_a^b x^n dx = \begin{cases} \dfrac{b^{n+1} - a^{n+1}}{n+1} & n \neq -1 \\ \ln\left(\dfrac{b}{a}\right) & n = -1 \text{ and } ab > 0 \\ \text{undefined if} & \\ n = -1 \text{ and } ab \leq 0 & \end{cases}$$

Because the type of the function is Variant, it can return either a numerical value or a string message "Undefined" if the integral is undefined.

```
Function myInt(a As Double, b As Double, _
                n As Double) As Variant
    If n <> -1 Then
        myInt = (b ^ (n + 1) _
                - a ^ (n + 1)) / (n + 1)
    ElseIf a * b > 0 Then
        myInt = Log(b / a)
    Else
        myInt = "Undefined"
    End If
End Function
```

	A	B	C	D	E
1	a	1	1	2	1
2	b	2	2	-2	1
3	n	1	-1	-1	4
4	Integral				

2. The spreadsheet shown below the equations will be used to call your VBA function. Write the Excel statements necessary to determine the integral, using the function above, in cells B4:E4.

Write the formula =myInt(B1, B2, B3) in cell B4 and copy the formulas to cells C4:E4.

3. What values would you get in cells F1:F3 if you entered the formula =myInt(C1, D1, E1) in cell F1 and copied that formula to cells F2 and F3?

For cell F1 the formula myInt(C1, D1, E1) gives a = 1, b = 2, and n = 1 so that the integral is [2^(1+1) – 1^(1+1)]/(1+1) = (4 – 1) / 2 = 1.5

For cell F2 the copied formula becomes myInt(C2, D2, E2) which gives a = 2, b = -2, and n = 1 so that the integral is [2^(2+1) – (-2)^(1+1)]/(1+1) = (4 – 4) / 2 = 0

For cell F3 the copied formula becomes myInt(C3, D3, E3) which gives a = -1, b = -1, and n = 4 so that the integral is [(-1)^(2+1) – (-1)^(1+1)]/(4+1) = (1 – 1) / 5 = 0