

Question 1

i) There are many different correct answers to this question. Two possible versions of the function would be for example:

$$\underline{=IF(x<0,x^2+1,IF(OR(x=0,x=4),1,COS(x)))}$$

and

$$\underline{=IF(OR(x=0,x=4),1,IF(x<0,x^2+1,COS(x)))}$$

(each correct version will be awarded 6 marks)

ii) The questions can be best answered if we try to express this function in a form similar to the function of question i). If we call the function $g(x)$ then we have

$$g(x) = \begin{cases} x & x > 2 \text{ or } x < -2 \\ \frac{1}{x+2} & \text{for } -1 < x < 1 \\ x^3 & \text{otherwise} \end{cases}$$

Therefore the answers to the three questions are:

- (a) The function is positive for $x > 2$ and $1 \leq x \leq 2$ and $-1 < x \leq 1$ (that is for $x > -1$)
- (b) Since 1 is a positive number, the region where the function is greater than 1 must be somewhere in the region of question (b). If we look at the definition of the function we see that for $x \geq 1$ the function is always greater than 1, except at $x=1$ where it is exactly 1. Therefore the answer would be $x > 1$.
- (c) The function takes the value -8 exactly at $x = -8$ and at $x = -2$.

(5 marks for (a), 5 marks for (b) and 3 marks for (c))

Question 2

```
Function trig(x As Single) As Single
p = Application.WorksheetFunction.Pi()
a = Application.WorksheetFunction.HLookup(x, [a2:d7], 1)
b = Application.WorksheetFunction.HLookup(x, [a2:d7], 2)
Select Case x:
Case 0, p / 6, p / 4, p / 3, p / 2: trig = a ^ 2 * b ^ 4
Case Else
trig = (Sin(x) ^ 2) * (Cos(x)) ^ 4
End Select
End Function
```

(8 marks for correct SELECT CASE structure, 4 marks for correct variable type definitions, 8 marks for correct hlookup functions)

=trig(Pi()/3) ⇒ 0.046874993 (5 marks)

Question 3

```
Function times(x As Date, y As String) As String
q = Hour(x)
If y = "Sunday" Then
times = "Apologies, we are closed"
ElseIf y = "Saturday" Then
times = "Opening times are 10am to 5pm. Home deliveries between 11am and 6pm"
Else
If q >= 8 And q <= 11 Then
times = "We are open now. Home deliveries start at 11am"
ElseIf q > 11 And q <= 18 Then
times = "We are open now and carrying out home deliveries"
Else
times = "We are closed now. Home deliveries tomorrow between 11am and 6pm"
End If
End If
End Function
```

(14 marks for correct IF structures, 6 marks for correct variable type definitions, 5 marks for using correct time function)

Question 4

```
Function salary(x As String) As Variant
If x = "J.Maldacena" Or x = "A.Sen" Or x = "M.Boos" Or x = "N.Slavnov" Or x = "V.Korepin" Then
s = Application.WorksheetFunction.VLookup(x, [a2:e6], 4, False)
p = Application.WorksheetFunction.VLookup(x, [a2:e6], 3, False)
If p = "Assistant" Then
salary = s + (3 * s) / 100
ElseIf p = "Manager" Then
salary = s + (4 * s) / 100
Else
salary = s + (2 * s) / 100
End If
Else
salary = "not working here"
End If
End Function
```

(8 marks for correct IF structures, 4 marks for correct variable type definitions, 8 marks for correct VLOOKUP functions)

=salary("N.Slavnov") ⇒ 23460 (5 marks)