Question 1

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

=IF(x<0,x^5+1,IF(OR(x=1,x=10),x,2))

and

=IF(OR(x=1,x=10),x,IF(x<0,x^5+1,2))

(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

$$g(x) = \begin{cases} x & \text{for } x > 2 \text{ or } x = -1 \\ \frac{1}{x} & \text{for } x > 1 \text{ or } x < -1 \\ x^2 & \text{for all other values of x} \end{cases}$$

Therefore the answers to the three questions are:

(a) The function is positive 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 it takes values bigger than 1 for x > 2.
(c) The function takes the value 8 exactly at x = 8.

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

Question 2

```
Function sincos(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)
If x = 0 Or x = p / 6 Or x = p / 4 Or x = p / 3 Or x = p / 2 Then
sincos = a * b ^ 3
Else
sincos = Sin(x) * (Cos(x)) ^ 3
End If
End Function
```

(8 marks for correct IF ELSEIF structure, 4 marks for correct variable type defintions, 8 marks for correct hlookup functions)

$$=sincos(Pi()/6) \Rightarrow 0.324759513 \qquad (5 \text{ marks})$$

Question 3

```
Function timetable(x As Date, y As String) As String
q = Hour(x)
Select Case y
Case "Sunday": timetable = "Apologies, we are closed"
Case "Saturday": timetable = "Opening times are 10am to 5pm. No home deliveries today"
Case Else
Select Case q
Case 9 To 13: timetable = "We are open now. Home deliveries start at 13pm"
Case Is > 13, Is <= 18: timetable = "We are open now and carrying out home deliveries"
Case Else: timetable = "We are closed now. Home deliveries tomorrow between 13pm and 18pm"
End Select
End Select
End Function
```

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

Question 4

```
Function increase(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
increase = (3 * s) / 100
ElseIf p = "Manager" Then
increase = (4 * s) / 100
Else
increase = (2 * s) / 100
End If
Else
increase = "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)

$=$increase("M.Boos") $\Rightarrow$ 1440   (5 marks)