Problem 1:

```
start
get (A, B)
if A % 4 != 0 then
  A = A + (4 - A % 4)
end if

for i in A ... B increasing by 4
  if i % 100 == 0 then
    if i % 400 == 0 then
      display i
    end if
  else
    display i
  end if
end for
end
```

Problem 2B:

```
Start
num1 = 0
num2 = 0
Read (num1, num2)
For num in num1 ... num2
        sum = 1
        divider = 2
        While ((num / 2) >= divider) DO
                IF (num % divider == 0) Then
                        sum=sum + divider
                End IF
                divider = divider + 1
        End While
        IF (num == sum) Then
                Print (num , " is a perfect number.")
        Else
                Print (num , " is not a perfect number.")
        End IF
End For
End.
```

Problem 2A:
1: Start
2: num = 0
3: sum = 1
4: divider = 2
5: Read (num)
6: While ((num / 2) >= divider) DO
7: IF (num % divider == 0) Then
8: sum=sum+ divider
9: End IF
10: divider = divider + 1
11: End While
12: IF (num == sum AND num != 1) Then
13: Print (num , " is a perfect number.")
14: Else
15: Print (num , " is not a perfect number.")
16: End IF
17: End.

Trace the algorithm for the following values and show the output: 25, 1, 0, 6, 28

25:

Step #	num	sum	divider	output
1				
2	**0**			
3	0	**1**		
4	0	1	**2**	
5	**25**	1	2	
6	25	1	2	
7	25	1	**3**	
8	25	1	**4**	
9	25	**6**	**5**	
10	25	6	**6**	
11	25	6	**7**	
12	25	6	**8**	
13	25	6	**9**	
14	25	6	**10**	
15	25	6	**11**	
16	25	6	**12**	
17	25	6	**13**	25 is not a perfect number.

1:

Step #	num	sum	divider	output
1				
2	**0**			
3	0	**1**		
4	0	1	**2**	
5	**1**	1	2	1 is not a perfect number.

0:

Step #	num	sum	divider	output
1				
2	**0**			
3	0	**1**		
4	0	1	**2**	
5	**0**	1	2	0 is not a perfect number.

6:

Step #	num	sum	divider	output
1				
2	**0**			
3	0	**1**		
4	0	1	**2**	
5	**6**	1	2	
6	6	1	2	
7	6	**3**	**3**	
8	6	**6**	**4**	6 is a perfect number.

28:

Step #	num	sum	divider	output
1				
2	**0**			
3	0	**1**		
4	0	1	**2**	
5	**28**	1	2	
6	28	1	2	
7	28	**3**	**3**	
8	28	7	**4**	
9	28	7	**5**	
10	28	7	**6**	
11	28	**14**	**7**	
12	28	14	**8**	
13	28	14	**9**	
14	28	14	**10**	
15	28	14	**11**	
16	28	14	**12**	
17	28	14	**13**	
18	28	**28**	**14**	
19	28	28	**15**	28 is a perfect number.

Part B: Trace the following pseudocodes and display the outputs

Problem 1:

1: Start
2: n = 2839
3: sum = 0
4: iteration = 0
5: While (n > 0) Do
6: digit = n % 10
7: sum = sum + digit
8: n = n / 10
9: iteration = iteration +1
10: End While
11: Print (sum,)
12: Print (iteration)
13: End

Step #	n	sum	iteration	digit	output
1					
2	**2839**				
3	2839	**0**			
4	2839	0	**0**		
5	2839	0	0		
6	283	**9**	**1**	**9**	
7	28	**12**	**2**	**3**	
8	2	**20**	**3**	**8**	
9	0	**22**	**4**	**2**	
10	0	22	4	2	22
11	0	22	4	2	4

Problem 2:

1: Start
2: n = 2839
3: sum = 0
4: iteration = 0
5: While (n >= 0) Do
6: digit = n % 10
7: sum = sum + digit
8: n = n / 10
9: iteration = iteration +1
10: Print (iteration,)
11: End While
12: Print (sum)
13: End

Step #	n	sum	iteration	digit	output
1					
2	**2839**				
3	2839	**0**			
4	2839	0	**0**		
5	2839	0	0		
6	283	**9**	**1**	**9**	1
7	28	**12**	**2**	**3**	2
8	2	**20**	**3**	**8**	3
9	0	**22**	**4**	**2**	4
10	0	**22**	**5**	**0**	5
11	0	**22**	**6**	**0**	6
12	0	**22**	**7**	**0**	7
13	0	**22**	**8**	**0**	8

Error: The while loop will run forever and never terminate. This is due to the condition n >= 0. After all the digits are used up, the loop keeps running and adding to the iteration variable. It also keeps setting the digit variable to 0 and adds 0 to the sum variable. This has no effect on the sum variable. Since n is always going to be greater than or equal to 0 (0/10 = 0), the loop will never terminate and the sum will never print.

This error could be resolved by removing the = sign from line 5: While(n > 0) DO