● Describe two different approaches to problem solving

A **top-down approach** (also known as stepwise design and in some cases used as

a synonym of decomposition) is essentially the breaking down of a system to gain

insight into its compositional sub-systems. In a top-down approach an overview of

the system is formulated, specifying but not detailing any first-level subsystems.

Each subsystem is then refined in yet greater detail, sometimes in many additional

subsystem levels, until the entire specification is reduced to base elements. A

top-down model is often specified with the assistance of "black boxes", a concept

used to make problems easier to manipulate. However, black boxes may fail to

elucidate elementary mechanisms or be detailed enough to realistically validate

the model. Essentially, the top down approach starts with the big picture, and

breaks down from there into smaller segments.

A **bottom-up approach** is the piecing together of systems to give rise to more

complex systems, thus making the original systems sub-systems of the emergent

system. Bottom-up processing is a type of information processing aligned for

things like using incoming data from the environment to form a perception.

Information enters the eyes in one direction (input), and is then turned into an

image by the brain that can be interpreted and recognized as a perception

(output). In a bottom-up approach the individual base elements of the system are

first specified in great detail. These elements are then linked together to form

larger subsystems, which then in turn are linked, sometimes in many levels, until a

complete top-level system is formed. This strategy often resembles a "seed" model,

whereby the beginnings are small but eventually grow in complexity and

completeness. However, "organic strategies'' may result in a tangle of elements

and subsystems, developed in isolation and subject to local optimization as

opposed to meeting a global purpose.

In the software development process, the top-down and bottom-up approaches

play a key role.

● Answer the following and say what the theorem that governs this

relationship is called.

○ NOT(A OR B)= **(NOT A) AND (NOT B)**

○ NOT (A AND B) = **(NOT A) OR (NOT B)**

○ The theorem is: **De Morgan’s theorem**

**Identify each of these logic gates by name, and complete their respective truth tables**

**1 . OR gate**

****

**2. AND gate**

****

**3. Neg -AND**

|  |  |  |
| --- | --- | --- |
| **A** | **B** | **Output** |
| **0** | **0** | **1** |
| **0** | **1** | **0** |
| **1** | **0** | **0** |
| **1** | **1** | **0** |

**4. NOR gate**

****

**5. NAND gate**

****

**6. Neg-OR**

|  |  |  |
| --- | --- | --- |
| **A** | **B** | **Output** |
| **0** | **0** | **1** |
| **0** | **1** | **1** |
| **1** | **0** | **1** |
| **1** | **1** | **0** |

**7. EXOR gate**

****

**8. EXNOR gate**

****

**9.** **NOT gate**

|  |  |
| --- | --- |
| **A** | **Output** |
| **0** | **1** |
| **1** | **0** |