Sample Solution for Question 1.1

The four stages are: Requirements Specification; Software Design; Implementation; and Testing.

Stage 1: Communicate with stakeholders, identify the services and constraints of the system, and specify the requirements; SRS will be produced.

Stage 2: Establish the architecture and perform detail design; architecture design document and detail design document will be produced.

Stage 3: Develop programs; code will be produced.

Stage 4 Stage 3: Test programs; test cases will be produced.
Heating System Use Case Diagram

User

- Turn on system
- Turn off system
- Reset Controller
- Set Desired Temperature
```plaintext
Heating System Class Diagram

**Controller**
- controllerState : {on, off, error} = off
  + reset()
  + switchOn()
  + switchOff()
  + requestCurrentTemp()

**Thermostat**
- LCDDisplay
- Keypad
  + display()
  + dialDigit()
  + turnOn()
  + turnOff()
  + trackDesiredTemp()

**Furnace**
- furnaceState : {on, off, error} = off
  + activateFurnace()
  + deactivateFurnace()
  + resetFurnace()
  + furnaceFault()

**Sensor**
- currentTemperature
  + measureCurrentTemp()

**User**
- controllerState : {on, off, error} = off
  + reset()
  + switchOn()
  + switchOff()
  + requestCurrentTemp()

**Controller** operate **Thermostat** display

**Controller** control **Furnace**

**Controller** getTemperature **Sensor**
```

1: dialDigit(7)
  1.1: display(7)
  2: dialDigit(5)
  2.1: display(75)

2.2: sendDesiredTemp
  2.2.1: requestTemp

3: measureCurrentTemp...

4: sendTemp(70)

4.1: activateFurnace()