**Rules for heater<->thermostat feedback**

• Heat loss increases as the difference between inside & outside increases.

• When thermostat registers that the house temperature is below its setting, the heater turns on.

• When house temperature registers higher, the heater turns off.

**Try this out in the table below using actual numbers.**

**Then notice what you did and express that as a formula.**

**When ready, move to the** spreadsheet**.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |
| ***Parameters -- set by instructor*** | | |  |  |  |
| Outside temperature | |  |  |  | 10 |
| Rate of heat loss per minute per degree difference between inside and outside | | | | | 0.05 |
| Rate of heat production by furnace (degree rise/minute) | | | |  | 4 |
|  |  |  |  |  |  |
| ***Variables -- for you to play with*** | | |  |  |  |
| Thermostat registers temperature every N minutes | | | |  | 2 |
| House temperature | |  |  | starts at | 55 |
| Thermostat setting | |  |  | starts at | 65 |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
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|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| **time** | **temp** | **thermostat** | **heater output** | **heat loss** |  |
| **0** |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

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**Repeat for subsequent exercises that incorporate additional rules.**

**Move to same spreadsheet, but** part 2**.**