**Home Heating Program (UML Diagram)**

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| Main |
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| +GUI() |

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| Timer |
| -frequency: double  -runTime: int |
| +calcFreq(): double  +calcRTime(): int |

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| --- |
| Environment |
| -outTemp(): double |
| +setTemp(): void |

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| Furnace |
| -furnaceType: String  -yearBuilt:double  -capacity: double  -efficiency: double  -pilotLight: Boolean  -heating: Boolean  -BLC: double  -SHC: double |
| +furnaceOn(): int  +furnaceOff(): int  +heatOutput(): double |

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| --- |
| GUI |
|  |
| -CalculateButtonListener()  -ExitButtonListener()  -buildPanel()  +toString():String |

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| LivingArea |
| -inTemp: double  -area: double  -SHC: double  -BLC: double  -iniTemp: double |
| +setArea(): void  +setTemp(): void |

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| Thermostat |
| -thermoSetting: double  -overheat: double |
| +setTemp(): double  +setOverHeat(): double  +getTemp(): double  +getOverheat(): double |

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| JFrame |
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|  |

Has a

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Extends

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Test Plan:

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| Test# | Reason for test case | Input Values | Desired Result | Observed Result | Pass/Fail |
| 1 | If the program works using a gas furnace | Room Temp: 20  Thermostat Setting: 20  Environment Temp: -5  Furnace Type: gas  Furnace Efficiency: 0.9  Furnace Capacity: 50000  Living Area: 1800  Thermostat overheat:2.0  Display Frequency: 5  Runtime:1200  Year Built:1988 | Furnace:  Off  On  On  On  On | http://puu.sh/of4WS/b561e200c4.png | Pass |
| 2 | If the program works using electric furnace | Room Temp: 20  Thermostat Setting: 20  Environment Temp: -5  Furnace Type: electric  Furnace Efficiency: 0.92  Furnace Capacity: 50000  Living Area: 1800  Thermostat overheat:2.0  Display Frequency: 5  Runtime:1200  Year Built:1988 | Furnace:  On  On  On  On  On | http://puu.sh/of53V/111c1b261b.png | Pass |
| 3 | If the program works in the year before 1980, using gas furnace | Room Temp: 20  Thermostat Setting: 20  Environment Temp: -5  Furnace Type: gas  Furnace Efficiency: 0.9  Furnace Capacity: 50000  Living Area: 1800  Thermostat overheat:2.0  Display Frequency: 5  Runtime:1200  Year Built:1977 | Furnace:  On  On  On  On  On | http://puu.sh/of5FU/4d55e820b8.png | Pass |
| 4 | If the program works in the year after 1980, using electric furnace | Room Temp: 20  Thermostat Setting: 20  Environment Temp: -5  Furnace Type: gas  Furnace Efficiency: 0.9  Furnace Capacity: 50000  Living Area: 1800  Thermostat overheat:2.0  Display Frequency: 5  Runtime:1200  Year Built:1977 | Furnace:  On  On  On  On  On | http://puu.sh/of5yy/a0724783ac.png | Pass |