## pos\_reg (Gradient Approach)

DATASET: **pos\_reg.csv (Positive-only):**

* **Contains only positive values** (as the name suggests)
* Feature range: **0.001 to +3.79** (all positive)
* Target range: **0.046 to +722.74** (all positive)

| **Model** | **MSE (Y1)** | **MSE (Y2)** | **Avg MSE** | **MAPE (Y1)** | **MAPE (Y2)** | **Avg MAPE** |
| --- | --- | --- | --- | --- | --- | --- |
| **Linear Regressor** | 4.29 | 4.15 | 4.22 | 141.12% | 152.37% | 146.75% |
| **GP Regressor** | 4.25 | 4.25 | 4.25 | 137.14% | 149.31% | 143.23% |
| **MLP Regressor** | 4.34 | 4.20 | 4.27 | 140.94% | 154.05% | 147.50% |
| **MultiOutput Regressor** | 4.43 | 4.41 | 4.42 | 138.60% | 158.39% | 148.50% |
| **SGD Regressor** | 4.34 | 4.14 | 4.24 | 142.49% | 151.42% | 146.96% |
| **Multi-GINN 1 Layer (4 PTA)** | 6.13 | 5.15 | 5.64 | 117.61 | 121.33 | 119.47 |
| **Multi-GINN 1 Layer (6 PTA)** | 5.45 | 4.89 | 5.17 | 118.27 | 127.33 | 122.80 |
| **Multi-GINN 2 Layer (4 PTA)** | 5.75 | 4.91 | 5.33 | 113.64 | 125.88 | 119.76 |
| **Multi-GINN 2 Layer (6 PTA)** | 9.44 | 4.92 | 7.18 | 86.04 | 126.33 | 106.18 |
| **Refitted Equations 1 Layer (4 PTA)** | 5.16 | 4.48 | 4.82 | 116.13 | 134.45 | 125.29 |
| **Refitted Equations 1 Layer (6 PTA)** | 5.16 | 4.48 | 4.82 | 116.13 | 134.45 | 125.29 |
| **Refitted Equations 2 Layer (4 PTA)** | 5.16 | 4.48 | 4.82 | 116.13 | 134.45 | 125.29 |
| **Refitted Equations 2 Layer (6 PTA)** | 5.16 | 4.48 | 4.82 | 116.13 | 134.45 | 125.29 |

**Refitted Equations:**

target 1

0.0141067633250099\*X\_1 + 0.101057771661917\*X\_10 + 0.00947937604395063\*X\_2 + 0.0482811672923964\*X\_3 + 0.150243140736745\*X\_4 - 0.00862048534871024\*X\_5 + 0.214175893361284\*X\_6 + 0.140881741460818\*X\_7 + 0.175839893701607\*X\_8 + 0.0423451245845976\*X\_9 - 0.112399903341276"

target 2

0.0672549207892894\*X\_1 + 0.140655559983646\*X\_10 + 0.00351185624833919\*X\_2 + 0.0268495821890112\*X\_3 + 0.0743209857831405\*X\_4 + 0.0590720784709409\*X\_5 + 0.000930233697692022\*X\_6 + 0.366279582809161\*X\_7 + 0.0983320165408118\*X\_8 + 0.11916956781585\*X\_9 - 0.166481598494045