# Evolution Strategies

Lopez Garduno Blanca Azucena
Resendiz Arteaga Juan Alberto

October 9, 2014

Max. generations: 1000 Epsilon: 1e-05 Sigma: 10 Mu: 10 Lambda: 10

| Func | 1+1 | u+1 | u+h | u,h |
|---|---|---|---|---|
| 1 | Vars: [0.48086342821670364] Fitness: -0.310020501954 Generations: 128 | Vars: [0.47998787645836655] Fitness: -0.310020077403 Generations: 283 | Vars: [0.4808645773276386] Fitness: -0.310020501955 Generations: 98 | Vars: [0.48085487837033364] Fitness: -0.310020501904 Generations: 69 |
| 2 | Vars: [3.258237156153765] Fitness: -181.622902908 Generations: 121 | Vars: [3.257536114182638] Fitness: -181.622889029 Generations: 393 | Vars: [3.2582589066762977] Fitness: -181.62290292 Generations: 78 | Vars: [3.2582627480807953] Fitness: -181.62290292 Generations: 69 |
| 3 | Vars: [-4.879452001104378e-06] Fitness: -1.03292335066e+17 Generations: 146 | Vars: [-6.448089128240424e-12] Fitness: -4.47598013621e+34 Generations: 1000 | Vars: [-7.824782362412849e-08] Fitness: -2.50475034523e+22 Generations: 88 | Vars: [-1.9259212446058442e-07] Fitness: -1.67983132086e+21 Generations: 69 |
| 4 | Vars: [0.45069559181490254] Fitness: 0.425516477945 Generations: 158 | Vars: [0.45067005160269086] Fitness: 0.425516481751 Generations: 546 | Vars: [0.4506988777571165] Fitness: 0.425516477897 Generations: 88 | Vars: [0.45070690768797445] Fitness: 0.425516478201 Generations: 69 |
| 5 | Vars: [-28.28013794218108] Fitness: -inf Generations: 10 | Vars: [-59.796974955387405] Fitness: -inf Generations: 0 | Vars: [-64.29671362341588] Fitness: -inf Generations: 0 | Vars: [-123.4075607229068] Fitness: -inf Generations: 0 |

Max. generations: 1000 Epsilon: 1e-05 Sigma: 10 Mu: 10 Lambda: 10

| Func | 1+1 | u+1 | u+h | u,h |
|------|-----|-----|-----|-----|
| 6 | Vars: [-238.2410148089046] Fitness: -inf Generations: 14 | Vars: [-251.46528275769055] Fitness: -inf Generations: 0 | Vars: [-242.49055665908824] Fitness: -inf Generations: 6 | Vars: [-191.96222999459548] Fitness: -3.08477979176e+301 Generations: 1 |
| 7 | Vars: [-0.9073359350076006] Fitness: 3.05785059222e-09 Generations: 161 | Vars: [-0.9073390941950636] Fitness: 3.05651790903e-11 Generations: 625 | Vars: [-0.9073388346395929] Fitness: 2.82095809159e-13 Generations: 112 | Vars: [-0.9073485959922802] Fitness: 3.55237100411e-08 Generations: 69 |
| 8 | Vars: [-7.634569475579279e+88] Fitness: -1.52691389512e+89 Generations: 1000 | Vars: [-8.610057636497515e+88] Fitness: -1.7220115273e+89 Generations: 1000 | Vars: [-3.977663198389967e+89] Fitness: -7.95532639678e+89 Generations: 1000 | Vars: [-159.06292344690283] Fitness: -318.122703577 Generations: 69 |
| 9 | Vars: [1.7774530840466155e+89] Fitness: -5.61557767737e+267 Generations: 1000 | Vars: [1.0907057319590504e+89] Fitness: -1.29754606942e+267 Generations: 1000 | Vars: [4.008795585963466e+89] Fitness: -6.44231171547e+268 Generations: 1000 | Vars: [199.1770400994619] Fitness: -7901650.61237 Generations: 69 |
| 10 | Vars: [-5.775074386198404] Fitness: -41165.6144066 Generations: 154 | Vars: [-5.775065689939869] Fitness: -41165.614407 Generations: 631 | Vars: [-5.775067457264484] Fitness: -41165.6144071 Generations: 128 | Vars: [-5.775067757632085] Fitness: -41165.6144071 Generations: 69 |
| 11 | Vars: [3.258260083340057] Fitness: -181.62290292 Generations: 116 | Vars: [3.2583063453089416] Fitness: -181.62290286 Generations: 476 | Vars: [3.2582590314425786] Fitness: -181.62290292 Generations: 128 | Vars: [3.2582616562757045] Fitness: -181.62290292 Generations: 69 |
| 12 | Vars: [-1.6464271895237875e-05, 0.999990190418972] Fitness: 1.46918610384e-09 Generations: 216 | Vars: [-0.0010169260319620008, 0.9997583909624561] Fitness: 4.36899927508e-06 Generations: 1000 | Vars: [-1.1426477935058408e-06, -0.9999993133046653] Fitness: 7.10877296928e-12 Generations: 188 | Vars: [8.954020296665132e-06, -1.000088881400564] Fitness: 6.36699711592e-10 Generations: 138 |
| 13 | Vars: [-0.030538970771299134, 0.00048807039171274347] Fitness: 4.35844828538e-07 Generations: 722 | Vars: [0.0014736521277105546, 0.0006787065358299431] Fitness: 9.1834201272e-07 Generations: 582 | Vars: [0.008555577221750052, 3.77902200722105e-05] Fitness: 2.68180464409e-09 Generations: 166 | Vars: [7.118149712283388, 50.485129603283134] Fitness: 2548.78177288 Generations: 138 |

Max. generations: 1000 Epsilon: 1e-05 Sigma: 10 Mu: 10 Lambda: 10

| Func | 1+1 | u+1 | u+h | u,h |
|---|---|---|---|---|
| 14 | Vars: [1.5150686808271672, 2.29282435767637] Fitness: 0.235498663129 Generations: 1000 | Vars: [8.116224373396607, 65.8776500745296] Fitness: 37.4092366188 Generations: 1000 | Vars: [5.520355956123154, 30.47883723452239] Fitness: 12.393921869 Generations: 1000 | Vars: [-9.497541820584228, 90.2154974477258] Fitness: 132.20090603 Generations: 138 |
| 15 | Vars: [0.9999412379184841, 3.000690775208727] Fitness: 8.65031927046e-09 Generations: 256 | Vars: [1.0005146339252635, 3.001746678544] Fitness: 2.37698703477e-05 Generations: 715 | Vars: [0.9999999594674868, 2.999999576503327] Fitness: 1.04228465863e-12 Generations: 176 | Vars: [0.9999902051760371, 3.0000291829068013] Fitness: 2.45117165046e-09 Generations: 138 |
| 16 | Vars: [27.851093121209182, 0.9632204166937202] Fitness: 0.396523949525 Generations: 166 | Vars: [-30.852849952444608, 1.0312209169731756] Fitness: 0.500870998795 Generations: 596 | Vars: [182.86336208259527, 0.9945536546619028] Fitness: 0.443647528454 Generations: 160 | Vars: [2.999996739924552, 0.5000089530824002] Fitness: 2.19926995404e-09 Generations: 138 |
| 17 | Vars: [-14.363810573148694, 205.84618469824105, -11.192326061341278, 125.49843963315317] Fitness: 1085098.68305 Generations: 1000 | Vars: [0.3949845135222911, -0.98914771374096, -6.2422348851074165, 37.50579040121713] Fitness: 12285.8587266 Generations: 1000 | Vars: [0.9500889088711469, 0.9024452610853578, 1.0477181226993488, 1.0980941945585032] Fitness: -0.0147757842957 Generations: 1000 | Vars: [-2.9267963412897355, 8.543191008980601, 0.0321201834174542, -0.6499239115819404] Fitness: 402.771343461 Generations: 276 |
| 18 | Vars: [-0.08984288452242475, 0.7126533363810268] Fitness: -1.03162845341 Generations: 216 | Vars: [0.08858891089896216, -0.7135160286953208] Fitness: -1.03161519432 Generations: 789 | Vars: [-0.08984060038060128, 0.7126539619615277] Fitness: -1.03162845344 Generations: 226 | Vars: [-0.08985718616362225, 0.7126638397210601] Fitness: -1.03162845225 Generations: 138 |

Max. generations: 1000 Epsilon: 1e-05 Sigma: 10 Mu: 10 Lambda: 10

| Func | 1+1 | u+1 | u+h | u,h |
|------|-----|-----|-----|-----|
| 19 | Vars: [2.2897385492625077, -0.2722346405609215, 0.63136007840168, 1.9940857108530514] Fitness: 15.0998037585 Generations: 1000 | Vars: [-4.267693160389272, 0.10428419998833238, 0.39778582861121625, - 3.9117813899456673] Fitness: 103.650341746 Generations: 1000 | Vars: [-0.036162165110790005, 0.0035814702695427503, - 0.017893322804498967, - 0.017825658184689137] Fitness: 3.67614238026e-06 Generations: 1000 | Vars: [37.51695191995373, -2.9520244956533137, 0.2998949725931449, 35.82530961273731] Fitness: 6615.2613272 Generations: 276 |
| 20 | Vars: [4.310484420477169e-06, -9.320961098349696e-06, - 5.215771328941217e-06] Fitness: 1.32664862292e-10 Generations: 309 | Vars: [0.009937328938082144, -0.005803210844759544, 0.0031733329649519595] Fitness: 0.000142497804639 Generations: 1000 | Vars: [5.596629043426731e-07, 2.224561141345447e-06, 3.4108945365585288e-06] Fitness: 1.68960963776e-11 Generations: 264 | Vars: [-1.1396504448524968e-06, -1.4701766023727557e-05, -2.6037963855318626e-05] Fitness: 8.95416289084e-10 Generations: 207 |
| 21 | Vars: [-7.763562223684405, 60.27832387851129] Fitness: 76.802966429 Generations: 196 | Vars: [-12.532524870783329, 157.06300898620097] Fitness: 183.129366421 Generations: 1000 | Vars: [-13.22488549706849, 174.89941902204365] Fitness: 202.347699596 Generations: 1000 | Vars: [0.9773646307345988, 0.9551727512797563] Fitness: 0.000512834251279 Generations: 138 |
| 22 | Vars: [-8.957654773150632e+17, -1.6104164817427995e+19, -1.7054154413605513e+19, -4.4064919817964575e+18, -1.2972953549750559e+19] Fitness: -5.14335302399e+19 Generations: 1000 | Vars: [- 1.2723994674416763e+19, -9.453213565905697e+18, -8.555132181031956e+18, - 2.1656936774518923e+19, -1.524025523732213e+19] Fitness: -6.76295324332e+19 Generations: 1000 | Vars: [-6.007044167425387e+19, -4.320034553164555e+19, -6.939822991774817e+19, -6.99720919755587e+19, - 4.796797111088819e+19] Fitness: -2.9060908021e+20 Generations: 1000 | Vars: [-329.00233169713846, -187.01274523892567, - 281.3910312304829, - 179.6215338607308, - 341.27804834593053] Fitness: -1322.0 Generations: 345 |

| Func | 1+1 | u+1 | u+h | u,h |
|---|---|---|---|---|
| 23 | Vars: [2.8743286081220027, -2.990531785979682, 1.9049185340841224, -2.054057585197553, 1.2881133030820944, -1.109373623088453, -0.3904087947255369, -1.6961721127273013, 0.8078220343383036, 0.9071443602601597, 1.1012756870316072, -1.1367341199862027, -0.04349841936237898, -1.2906983946880284, -0.9323466199644315, 0.7156873927036356, -1.2351098993308036, -0.4975884334725694, -0.027818436376817038, -1.1790994965621882, 0.5028594453432451, -0.7656627308403319, -0.3560323539995612, 0.3919135674812384, -0.7693224341382874, -0.8952077635895683, -0.46071916480237624, -0.737161036197962, 0.17950424164278633, 49.35255116447594] Fitness: 653.534616487 Generations: 1000 | Vars: [71.65225771326182, -62.167255835793924, -62.71928625872704, 15.859992630761578, 64.39695513429321, -26.78213403832297, -17.228443840066877, 25.73522277151541, 1.1980567377424265, 8.588002786934135, 1.5936983128698792, 51.549130768466746, -26.24126172365849, -29.957092458046937, -34.691790857384916, -51.17041559906837, -38.34182780617782, -50.221824928168516, 34.53640645362726, 37.32299296890779, -16.967433266686324, -2.2077278865004466, 56.137182663739424, 35.90491472809585, 19.242451753844417, 7.013956222534604, 28.812156786171943, 40.98680564733681, 8.635400984423704, 3.01896021354953] Fitness: 1018173641.18 Generations: 1000 | Vars: [0.39498544286087023, -0.8120139140413795, 1.0579622563829367, 0.3875856523335106, 0.15622326525146285, 0.6020805882981171, 0.20244411944442842, 0.3395393660887919, 0.06101034527587923, 0.6339771663535392, 0.11000306532267146, 0.132915069628735, 0.0024572764380487062, -0.36716053024576567, 0.29190127079321104, 0.2863521532236187, 0.3727650398578387, 0.09970331659457307, 0.16340856789797914, 0.5323083173148417, 0.5380699634654578, 0.10968207233738608, 0.31234867427728885, 0.30257216195155645, 0.6742095791489071, 0.1326822733064444, 0.28240821219768175, 0.25075461061334303, 0.11511491409813635, 1.2625121213462263] Fitness: 16.8621501988 Generations: 1000 | Vars: [0.17241225423209783, 0.21463786228759577, 0.6475367724165237, 0.07275875658138434, 0.48886993295253944, 0.23842265024313633, 0.13355628755248133, 0.3154460792608336, 0.1479733828778548, 0.11151381061009973, 0.050662752182328595, -0.14243700364178033, 0.4012561056704211, 0.3663944692901527, 0.13397559162448613, 0.34249840474977405, 0.30536131940408606, 0.15695959369831314, 0.24756315628201722, 0.20379642104336745, 0.33223872289169226, 0.2728364361271976, 0.03345706325187757, 0.2117366212677808, 0.12433615623637723, 0.030963450471450195, -0.16196067983634138, 0.09545542911894135, 0.08328977602027239, 20.856779434504656] Fitness: 3.40801827574 Generations: 1000 |

Max. generations: 1000 Epsilon: 1e-05 Sigma: 10 Mu: 10 Lambda: 10

| Func | 1+1 | u+1 | u+h | u,h |
|---|---|---|---|---|
| 24 | Vars: [-31.927877209530454, 31.92787910561179] Fitness: 19.9999371004 Generations: 186 | Vars: [-15.985675544580818, -16.053132261145596] Fitness: 5.99998798788 Generations: 403 | Vars: [-31.927872956475046, 31.92787310842866] Fitness: 19.9999371004 Generations: 142 | Vars: [0.02203329804181935, -15.975052762857866] Fitness: 6.99998204851 Generations: 138 |