Jerry Project

Xinyi Lin

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real-world data 1 - Experiment 7

The 'group' column started with 'B' is the indicators of replicates

```
##   batch        barcode condition           clusterRes                        x
## 1    B1 AAACATACCACAAC   Control Enterocyte.Progenitor Enterocyte.Progenitor
## 2    B1 AAACGCACGAGGAC   Control                  Stem                  Stem
## 3    B1 AAACGCACTAGCCA   Control                  Stem                  Stem
## 4    B1 AAACGCACTGTCCC   Control                  Stem                  Stem
## 5    B1 AAACTTGACCACCT   Control Enterocyte.Progenitor Enterocyte.Progenitor
## 6    B1 AAAGATCTACCTTT   Control Enterocyte.Progenitor Enterocyte.Progenitor
```

```
##     batch             barcode           condition           clusterRes
##  Length:9842        Length:9842        Length:9842        Length:9842
##  Class :character   Class :character   Class :character   Class :character
##  Mode  :character   Mode  :character   Mode  :character   Mode  :character
##       x
##  Length:9842
##  Class :character
##  Mode  :character
```

```
## # A tibble: 10 x 3
## # Groups:   batch [10]
##    batch condition        n
##    <chr> <chr>        <int>
##  1 B1    Control        840
##  2 B10   Salmonella     950
##  3 B2    Control        200
##  4 B3    Control       1258
##  5 B4    Control        942
##  6 B5    Hpoly.Day3    1490
##  7 B6    Hpoly.Day3     631
##  8 B7    Hpoly.Day10   1169
##  9 B8    Hpoly.Day10   1542
## 10 B9    Salmonella     820
```

control vs Hpoly.Day3

Get matrices

```
##                  cluster truth betabin_wMsvm_pvals betabin_wMsvm_Res
## 1               Endocrine     N        7.355075e-03                 P
## 2              Enterocyte     N        4.297784e-01                 N
## 3 Enterocyte.Progenitor     N        7.978457e-02                 N
## 4                  Goblet     N        2.255269e-01                 N
```

```
## 5                 Stem    N          1.086361e-01                    N
## 6                   TA    N          8.195846e-01                    N
## 7             TA.Early    N          3.710110e-01                    N
## 8                 Tuft    P          1.737348e-05                    P

##     Control Hpoly.Day10 Hpoly.Day3 Salmonella
##       3240        2711       2121       1770
```

control vs Hpoly.Day10

control vs Salmonella

real-world data 2: Tikhonova_2019

Paper name: Single cell transcriptome profiling of the bone marrow niche at steady state and under stress conditions

```
## [1] "Empty cell type exists in at least one conidtion; adding replicate & condition specific pseudo
##    cluster truth betabin_wMU_pvals betabin_wMU_Res
## 1        C     N       2.378857e-05               P
## 2        O     P       3.367114e-02               P
## 3       P1     N       1.465554e-22               P
## 4       P2     P       9.459588e-23               P
## 5       P3     N       7.682798e-01               N
## 6       P4     N       7.530881e-07               P
## 7       P5     P       5.567989e-01               N
## 8        V     P       6.680084e-01               N

##                      p_val avg_log2FC pct.1 pct.2    p_val_adj
## Fabp4      0.000000e+00  2.7029418 0.993 0.876 0.000000e+00
## Spp1       0.000000e+00 -2.0281498 0.989 0.996 0.000000e+00
## Plvap      0.000000e+00  1.5820905 0.943 0.516 0.000000e+00
## Lrg1       0.000000e+00  2.0167691 0.958 0.590 0.000000e+00
## Cxcl1      0.000000e+00 -0.3313974 0.776 0.337 0.000000e+00
## Ccl2       0.000000e+00 -1.1070760 0.852 0.434 0.000000e+00
## Ccl7       0.000000e+00 -0.7641159 0.855 0.396 0.000000e+00
## Cldn5      0.000000e+00  1.8146759 0.923 0.513 0.000000e+00
## Ctla2a     0.000000e+00  1.4736811 0.893 0.496 0.000000e+00
## Emp3       0.000000e+00 -0.7252495 0.886 0.856 0.000000e+00
## Egfl7      0.000000e+00  1.2890176 0.876 0.465 0.000000e+00
## Kdr        0.000000e+00  1.2281712 0.882 0.465 0.000000e+00
## Srgn       0.000000e+00  1.0076431 0.840 0.480 0.000000e+00
## Tfpi       0.000000e+00  1.7768692 0.906 0.490 0.000000e+00
## Cdh5       0.000000e+00  1.2351661 0.895 0.468 0.000000e+00
## Stab2      0.000000e+00  1.3076913 0.921 0.511 0.000000e+00
## Esam       0.000000e+00  1.1426338 0.874 0.460 0.000000e+00
## Emcn       0.000000e+00  1.1073068 0.819 0.431 0.000000e+00
## Ibsp       0.000000e+00 -1.4157874 0.937 0.965 0.000000e+00
## Gpihbp1    0.000000e+00  1.5246805 0.883 0.479 0.000000e+00
## Flt1       0.000000e+00  0.9796847 0.799 0.452 0.000000e+00
## Fam167b    0.000000e+00  1.2123740 0.879 0.473 0.000000e+00
## Mrc1       0.000000e+00  0.9570899 0.840 0.456 0.000000e+00
## Ubd        0.000000e+00  1.5085351 0.881 0.501 0.000000e+00
## Ackr1      0.000000e+00  1.2417190 0.815 0.468 0.000000e+00
## Serpine2   0.000000e+00 -1.0704097 0.958 1.000 0.000000e+00
## Pecam1     0.000000e+00  0.9231046 0.768 0.408 0.000000e+00
```

```
## Rgs4           0.000000e+00   0.9834078 0.788 0.454   0.000000e+00
## Cyp4b1         0.000000e+00   1.1033878 0.840 0.465   0.000000e+00
## Mmrn2          0.000000e+00   1.1041278 0.805 0.381   0.000000e+00
## Gpm6a          0.000000e+00   1.1760816 0.855 0.416   0.000000e+00
## Dnase1l3       0.000000e+00   0.9412005 0.807 0.458   0.000000e+00
## Gpx3           0.000000e+00  -0.8871023 0.944 0.993   0.000000e+00
## Eng            0.000000e+00   1.0315681 0.859 0.434   0.000000e+00
## Stab1          0.000000e+00   0.8774913 0.844 0.487   0.000000e+00
## Thbd           0.000000e+00   0.8245690 0.856 0.448   0.000000e+00
## Clca3a1        0.000000e+00   0.8307148 0.781 0.422   0.000000e+00
## Cp             0.000000e+00  -0.8799227 0.907 0.945   0.000000e+00
## Flt4           0.000000e+00   0.7124604 0.790 0.456   0.000000e+00
## Cst3           0.000000e+00  -0.6217025 0.992 1.000   0.000000e+00
## Cfh            0.000000e+00  -0.9533620 0.906 0.912   0.000000e+00
## Kcnj8          0.000000e+00   0.7222807 0.742 0.397   0.000000e+00
## Abcc9          0.000000e+00   0.6768283 0.831 0.454   0.000000e+00
## Thrsp          0.000000e+00   0.8265131 0.750 0.412   0.000000e+00
## Gm1673         0.000000e+00   1.1342532 0.789 0.387   0.000000e+00
## Klf4           0.000000e+00   0.9665025 0.837 0.476   0.000000e+00
## Tspan7         0.000000e+00   0.8001734 0.783 0.392   0.000000e+00
## Tpm1           0.000000e+00  -0.7565368 0.954 0.967   0.000000e+00
## Ly6e           0.000000e+00   0.8659786 0.970 0.709   0.000000e+00
## Gpr182         0.000000e+00   0.7812263 0.781 0.411   0.000000e+00
## Ptprb          9.521037e-308  0.7685928 0.796 0.484   1.904207e-304
## Selp           5.329049e-299  0.8232585 0.736 0.390   1.065810e-295
## Timp3          4.116956e-298  0.8073970 0.894 0.545   8.233911e-295
## Aldh1a2        2.827587e-296 -0.2928561 0.782 0.265   5.655174e-293
## Gpx8           9.635838e-289 -0.6662226 0.897 0.920   1.927168e-285
## Ebf1           5.821673e-288 -0.6966540 0.909 0.939   1.164335e-284
## Col1a2         1.032198e-285 -0.2564561 0.928 0.979   2.064397e-282
## Rasip1         3.335518e-285  0.7104106 0.749 0.425   6.671036e-282
## Ets1           4.519248e-276  0.6034186 0.809 0.419   9.038495e-273
## Ccl9           2.017880e-275 -0.2502546 0.846 0.441   4.035760e-272
## Il6st          6.000364e-274  0.8114984 0.941 0.664   1.200073e-270
## Hba-a2         1.247076e-272 -0.3197617 0.862 0.426   2.494152e-269
## Ifitm1         1.485296e-270 -0.3266204 0.819 0.435   2.970591e-267
## Cd93           2.680558e-266  0.7226006 0.720 0.324   5.361116e-263
## Cd36           1.949693e-263  1.0032872 0.726 0.414   3.899387e-260
## F8             9.838233e-253  0.7386346 0.728 0.390   1.967647e-249
## Olfml3         2.203732e-252 -1.0173319 0.892 0.840   4.407465e-249
## Nr2f2          3.524946e-251  0.6742416 0.730 0.380   7.049891e-248
## Olfml2b        1.176470e-246 -1.0051711 0.887 0.781   2.352941e-243
## Fcgr2b         2.407419e-244  0.8485225 0.740 0.432   4.814838e-241
## Ramp2          6.211768e-242  0.7082815 0.809 0.462   1.242354e-238
## Hbb-bt         8.144808e-240 -0.3075566 0.855 0.457   1.628962e-236
## Pde2a          1.083946e-239  0.6387153 0.717 0.350   2.167892e-236
## Aldob          2.120472e-233  0.7016766 0.726 0.419   4.240944e-230
## Apold1         1.935928e-228  1.0471310 0.726 0.431   3.871855e-225
## Pim3           8.346161e-228  0.9002023 0.763 0.401   1.669232e-224
## Ecscr          1.005251e-227  0.7813097 0.706 0.347   2.010503e-224
## Rgs16          3.050969e-223 -0.3387353 0.740 0.348   6.101938e-220
## Sepp1          9.735309e-223  0.7063800 0.998 0.959   1.947062e-219
## S100a11        1.961049e-221 -0.4327077 0.952 0.987   3.922099e-218
## Xist           9.210858e-221  0.9216588 0.694 0.322   1.842172e-217
```

3

```
## Cd38        1.302512e-218  0.6498619 0.710 0.411 2.605024e-215
## Sh3bp5      1.681878e-216  0.6194066 0.739 0.382 3.363757e-213
## Cxcl12      1.847343e-215 -0.9836842 0.992 0.998 3.694687e-212
## S100a6      2.040854e-213 -1.0826303 0.888 0.819 4.081709e-210
## Ly6a        6.548695e-208  1.2747469 0.685 0.374 1.309739e-204
## Ushbp1      2.612777e-205  0.6050683 0.714 0.433 5.225554e-202
## F11r        4.799420e-202  0.6424014 0.701 0.405 9.598839e-199
## Cd300lg     3.949006e-199  0.8668981 0.699 0.410 7.898012e-196
## Ltc4s       1.104510e-198  0.8057030 0.717 0.426 2.209020e-195
## Il6         2.337521e-198 -0.2884110 0.683 0.322 4.675042e-195
## Ndnf        2.902243e-197 -0.3337977 0.788 0.339 5.804485e-194
## Robo4       4.366609e-191  0.6062419 0.713 0.422 8.733219e-188
## Apod        1.777267e-190 -0.4643838 0.874 0.557 3.554533e-187
## Gsta4       2.676549e-190 -0.2527169 0.796 0.381 5.353098e-187
## Tie1        1.117384e-188  0.6283875 0.706 0.432 2.234769e-185
## Gdpd2       2.339322e-187 -0.8082670 0.910 0.905 4.678644e-184
## Ier3        6.964925e-187  0.7408598 0.899 0.649 1.392985e-183
## Btnl9       6.154045e-184  0.7167969 0.694 0.385 1.230809e-180
## Tek         1.287059e-177  0.6291506 0.703 0.419 2.574118e-174
## Mafb        7.071331e-177  0.6254120 0.904 0.650 1.414266e-173
## Serping1    1.618679e-174 -0.8672235 0.928 0.939 3.237358e-171
## Klf2        1.977694e-174  0.4913680 0.915 0.656 3.955387e-171
## Btg2        3.860638e-173  0.4222637 0.886 0.608 7.721275e-170
## Adamts4     2.204829e-172  0.5652141 0.701 0.408 4.409659e-169
## Sdpr        3.043378e-172  0.8104157 0.645 0.243 6.086757e-169
## Adamts5     8.073260e-172  0.7040486 0.809 0.468 1.614652e-168
## Cald1       4.439927e-169 -0.4543841 0.931 0.927 8.879854e-166
## Ism1        8.442914e-168 -0.2949992 0.799 0.414 1.688583e-164
## Adgrl4      2.650228e-166  0.5692289 0.667 0.346 5.300457e-163
## Angpt1      1.214063e-163 -0.2893245 0.837 0.430 2.428125e-160
## Fstl1       7.137120e-163 -0.6113188 0.900 0.897 1.427424e-159
## Serpinb6a   1.976075e-160  0.5385570 0.834 0.561 3.952149e-157
## Atf3        3.916745e-159  0.4266884 0.716 0.410 7.833490e-156
## Plpp1       6.018711e-159  0.8156593 0.685 0.377 1.203742e-155
## Hba-a1      8.981788e-159 -0.4586964 0.890 0.505 1.796358e-155
## Tinagl1     3.281935e-156  0.8001026 0.652 0.309 6.563870e-153
## Islr        3.314437e-152 -0.7173982 0.889 0.809 6.628874e-149
## Spon1       1.117147e-151 -0.2658067 0.827 0.388 2.234295e-148
## Gas6        5.305625e-151 -0.7266778 0.932 0.933 1.061125e-147
## Sgk1        7.378700e-151  0.6209501 0.733 0.427 1.475740e-147
## Tm4sf1      1.365585e-148  0.8695751 0.790 0.490 2.731170e-145
## Fam13a      3.695975e-148 -0.3934061 0.800 0.413 7.391950e-145
## Efemp1      5.053012e-146 -0.3363579 0.846 0.456 1.010602e-142
## Nid1        4.680168e-145  0.3489323 0.800 0.499 9.360336e-142
## Irf8        4.346988e-143  0.4345596 0.719 0.407 8.693975e-140
## Fbln5       2.249175e-140 -0.7009422 0.912 0.856 4.498349e-137
## Icam2       5.179543e-138  0.6685270 0.663 0.377 1.035909e-134
## Vamp5       6.946751e-138  0.4974733 0.717 0.398 1.389350e-134
## Ramp1       1.992052e-137 -0.2514180 0.829 0.469 3.984105e-134
## Hist1h2ap   9.582686e-137 -0.6997211 0.704 0.321 1.916537e-133
## Ipo11       8.575516e-136  0.6031758 0.649 0.327 1.715103e-132
## Icam1       1.811878e-134  0.4251752 0.798 0.545 3.623756e-131
## Igfbp5      2.999430e-132 -1.2122602 0.919 0.867 5.998859e-129
## Timp2       8.044103e-132 -0.4944063 0.889 0.814 1.608821e-128
```

```
## Dusp1       1.070557e-130  0.2667716 0.872 0.616 2.141113e-127
## Cxcl14      6.808558e-130 -0.9996535 0.919 0.899 1.361712e-126
## Ppp1r15a    8.797594e-129  0.4409529 0.806 0.511 1.759519e-125
## Rmnd1       4.323548e-128 -0.5530871 0.857 0.476 8.647096e-125
## Cdkn1a      1.291868e-127  0.6341295 0.773 0.494 2.583736e-124
## G0s2        2.856958e-127 -0.3295600 0.810 0.423 5.713916e-124
## Marc1       1.964357e-125 -0.3012404 0.833 0.435 3.928713e-122
## Tspan15     2.744348e-125  0.5554179 0.656 0.351 5.488696e-122
## Col25a1     2.959296e-125 -0.2647209 0.828 0.401 5.918591e-122
## Txnip       4.301108e-124  0.4259431 0.916 0.704 8.602215e-121
## Il1rn       7.664380e-124 -0.4176231 0.824 0.455 1.532876e-120
## Hp          1.819411e-123 -0.9253175 0.958 0.983 3.638822e-120
## Crip1       2.165773e-122 -0.6127469 0.892 0.788 4.331545e-119
## Hbb-bs      4.401760e-122 -0.4993949 0.905 0.539 8.803521e-119
## Tgm2        5.225792e-122  0.3438623 0.784 0.488 1.045158e-118
## Hspa1b      2.400805e-120  0.4986959 0.842 0.600 4.801610e-117
## Kitl        1.376451e-118 -0.7172179 0.897 0.842 2.752902e-115
## Clu         4.641545e-118 -0.6823269 0.907 0.878 9.283091e-115
## Mki67       1.045590e-117 -0.2653332 0.606 0.212 2.091181e-114
## Plac8       3.530862e-117 -0.4033198 0.820 0.445 7.061725e-114
## Sertad1     3.296721e-116  0.4859209 0.759 0.490 6.593441e-113
## Adamts2     6.374866e-116 -0.6475157 0.880 0.773 1.274973e-112
## Adgrf5      2.382158e-114  0.3244649 0.812 0.513 4.764316e-111
## Hspa1a      5.495513e-114  0.4682980 0.965 0.797 1.099103e-110
## Kdm6b       8.529327e-114  0.2966031 0.720 0.428 1.705865e-110
## Csf1        1.831173e-113 -0.5992277 0.894 0.798 3.662346e-110
## Cxadr       1.104157e-112  0.6164112 0.636 0.340 2.208314e-109
## Ier2        9.382430e-112  0.3487338 0.826 0.577 1.876486e-108
## Fam20c      1.276925e-111 -0.2701644 0.787 0.409 2.553849e-108
## Adgrg3      1.764135e-108  0.5107260 0.642 0.341 3.528270e-105
## C5ar1       1.294004e-106  0.2684250 0.338 0.180 2.588008e-103
## Ecm1        2.442739e-106 -0.5903435 0.901 0.812 4.885478e-103
## Limch1      1.308420e-105 -1.0204186 0.869 0.738 2.616839e-102
## Col6a1      1.015883e-104 -0.6476580 0.880 0.753 2.031767e-101
## Car3        1.325184e-103 -0.2946446 0.737 0.359 2.650367e-100
## Plk2        1.559755e-103  0.5576711 0.632 0.306 3.119511e-100
## Gimap6      7.112247e-103  0.6169020 0.667 0.417  1.422449e-99
## Ndrg1       2.071741e-102  0.6039929 0.684 0.394  4.143483e-99
## Clec14a     6.778232e-102  0.4706279 0.627 0.276  1.355646e-98
## Kank3       7.455405e-101  0.5215525 0.619 0.309  1.491081e-97
## Galnt15     1.753740e-100  0.3894987 0.618 0.315  3.507480e-97
## Pparg       7.640050e-100  0.5471714 0.648 0.311  1.528010e-96
## Plagl1       1.743901e-99 -0.2676182 0.751 0.370  3.487802e-96
## Nupr1        1.217278e-98 -0.4585472 0.912 0.880  2.434556e-95
## Nfkbia       3.864704e-98  0.3330532 0.936 0.754  7.729408e-95
## Fap          5.972277e-98 -0.7758200 0.873 0.693  1.194455e-94
## Gngt2        1.714304e-96  0.3996181 0.659 0.396  3.428607e-93
## Enpp2        6.407384e-95 -0.2873109 0.826 0.505  1.281477e-91
## Olfml2a      4.333855e-94 -0.3606228 0.843 0.497  8.667711e-91
## Pkm          9.453253e-93  0.3814186 0.819 0.603  1.890651e-89
## Id2          6.177167e-92  0.5774914 0.718 0.474  1.235433e-88
## Abi3bp       1.076415e-90 -0.7323202 0.883 0.760  2.152831e-87
## Crim1        1.466673e-89  0.4160094 0.663 0.360  2.933346e-86
## Hoxa9        3.872162e-89 -0.2534894 0.756 0.398  7.744324e-86
```

```
## Rps3              4.859610e-87   0.3204057 1.000 0.982  9.719219e-84
## Cnn2              8.406828e-85  -0.5273248 0.876 0.740  1.681366e-81
## Lifr              1.048083e-84  -0.7605041 0.899 0.758  2.096165e-81
## Elk3              1.231995e-84   0.4584586 0.645 0.369  2.463989e-81
## Cpe               5.575722e-84  -0.3537576 0.830 0.470  1.115144e-80
## Bhlhe40           1.007810e-83   0.4253445 0.678 0.394  2.015619e-80
## Epdr1             9.531312e-83  -0.6311822 0.875 0.740  1.906262e-79
## Plxnd1            2.087786e-82   0.2907911 0.750 0.529  4.175572e-79
## Vegfc             2.458800e-82  -0.3727369 0.863 0.490  4.917600e-79
## Notch3            1.197544e-81  -0.4000801 0.860 0.518  2.395089e-78
## Adamts1           2.733302e-81   0.3290339 0.743 0.476  5.466604e-78
## Rasl11a           7.162644e-81  -0.5602082 0.862 0.536  1.432529e-77
## Htra3             1.083886e-80  -0.2704828 0.728 0.368  2.167772e-77
## Lgals1            5.043278e-80  -0.4729724 0.909 0.824  1.008656e-76
## Ptx3              5.594836e-80  -0.5923910 0.844 0.478  1.118967e-76
## Junb              1.421288e-78   0.2755359 0.986 0.888  2.842576e-75
## Pltp              1.044331e-77  -0.2762628 0.827 0.494  2.088662e-74
## Sulf1             1.185360e-77  -0.4059584 0.852 0.534  2.370720e-74
## Gadd45g           3.907140e-76   0.2839948 0.962 0.850  7.814281e-73
## Id1               4.648026e-76   0.8252135 0.669 0.445  9.296052e-73
## Rpl39l            5.554531e-75  -0.3070498 0.775 0.434  1.110906e-71
## Lepr              7.764140e-75  -0.7426396 0.902 0.793  1.552828e-71
## Trp53i11          1.359545e-74   0.5020532 0.629 0.373  2.719090e-71
## S100b             3.810405e-74  -1.0462748 0.873 0.658  7.620810e-71
## Angptl4           4.868613e-74   0.6046024 0.886 0.684  9.737225e-71
## Esm1              8.673649e-74  -0.8319543 0.904 0.820  1.734730e-70
## Grap              9.190765e-74   0.3841022 0.613 0.329  1.838153e-70
## H3f3a             2.699795e-72  -0.2611344 0.985 0.964  5.399590e-69
## C5ar2             4.867920e-72   0.2725131 0.369 0.250  9.735839e-69
## Tsc22d3           5.310753e-72  -0.6099957 0.892 0.763  1.062151e-68
## Adgrg6            5.404027e-72   0.5315435 0.635 0.371  1.080805e-68
## Csrnp1            1.123984e-71   0.4669975 0.637 0.377  2.247968e-68
## Prdx5             1.756371e-71  -0.3038803 0.928 0.893  3.512742e-68
## Crispld1          3.105085e-71   0.3251531 0.380 0.265  6.210170e-68
## Crip2             4.360250e-71   0.3529724 0.753 0.497  8.720499e-68
## Cracr2b           7.608528e-71   0.5253532 0.633 0.392  1.521706e-67
## Pid1              1.880002e-70  -0.4409936 0.855 0.494  3.760004e-67
## Mettl7a1          2.071848e-70  -0.2695270 0.745 0.423  4.143696e-67
## Pgf               2.594090e-69  -0.3693399 0.812 0.503  5.188180e-66
## Jup               2.807997e-69   0.3012707 0.670 0.429  5.615994e-66
## Vldlr             5.039695e-67  -0.3462518 0.789 0.413  1.007939e-63
## H2afv             5.591280e-67  -0.4470735 0.870 0.772  1.118256e-63
## Cldn10            9.293156e-67  -0.7932457 0.882 0.729  1.858631e-63
## Prc1              3.157761e-66  -0.2504120 0.567 0.188  6.315523e-63
## Enpp1             4.480251e-66  -0.3612685 0.825 0.461  8.960501e-63
## Clec11a           7.755579e-66  -0.6805865 0.838 0.650  1.551116e-62
## Satb2             1.249525e-65  -0.3446474 0.816 0.465  2.499050e-62
## Rasd1             3.511174e-65   0.5608409 0.624 0.402  7.022347e-62
## 8430408G22Rik     3.635258e-65   0.6255016 0.640 0.402  7.270517e-62
## Sfrp1             2.571302e-63  -0.3493475 0.840 0.483  5.142604e-60
## Abcg2             8.037989e-63   0.4478170 0.645 0.344  1.607598e-59
## H2-Q7             1.435350e-62  -0.3588228 0.905 0.818  2.870700e-59
## Mdk               1.943339e-62  -0.6698636 0.894 0.776  3.886678e-59
## Lamb1             5.016004e-62  -0.3477941 0.808 0.473  1.003201e-58
```

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## Ackr4         3.186607e-61 -0.6828504 0.879 0.718  6.373214e-58
## C2            2.986583e-60 -0.4543107 0.849 0.527  5.973166e-57
## Bst2          6.437628e-60  0.2981382 0.929 0.751  1.287526e-56
## Dab2          1.355667e-59  0.4088984 0.659 0.381  2.711333e-56
## Postn         1.447888e-59 -0.8107512 0.841 0.487  2.895776e-56
## Rhoj          1.471634e-59  0.3779966 0.653 0.400  2.943269e-56
## Prdx4         7.954346e-58 -0.3616879 0.933 0.899  1.590869e-54
## Pdlim4        1.014390e-57 -0.3729188 0.819 0.489  2.028780e-54
## Cygb          1.089142e-56 -0.3979697 0.868 0.569  2.178283e-53
## Igfbp4        1.608909e-56 -0.4029062 0.998 0.993  3.217819e-53
## Bok           1.142601e-55  0.4725842 0.653 0.405  2.285202e-52
## Prex2         2.736647e-55  0.4596820 0.588 0.307  5.473295e-52
## Aqp1          1.261268e-54  0.9255946 0.699 0.506  2.522536e-51
## Esr1          2.305596e-54 -0.3399044 0.808 0.513  4.611192e-51
## Rhob          5.412743e-54  0.2651564 0.793 0.615  1.082549e-50
## Cyyr1         6.447235e-53  0.6617496 0.592 0.343  1.289447e-49
## Metrnl        8.614085e-53 -0.3186338 0.800 0.503  1.722817e-49
## Fosl2         3.582786e-51  0.4727486 0.657 0.435  7.165572e-48
## Rgs2          1.093011e-50  0.2737302 0.633 0.344  2.186021e-47
## Stom          6.894550e-50  0.5147160 0.584 0.305  1.378910e-46
## Gimap4        1.670827e-49  0.5571796 0.619 0.381  3.341653e-46
## Itm2a         2.806921e-49 -0.6525828 0.881 0.731  5.613841e-46
## Agt           5.822764e-49 -0.6109404 0.897 0.822  1.164553e-45
## Gapdh         8.838267e-49  0.2658102 0.928 0.774  1.767653e-45
## Ppfibp2       1.627255e-48 -0.3994249 0.769 0.429  3.254510e-45
## Adipoq        9.375697e-48 -0.8840321 0.920 0.847  1.875139e-44
## Plscr2        2.018180e-47  0.3250051 0.549 0.216  4.036360e-44
## Mgp           5.489129e-47 -1.2079041 0.948 0.931  1.097826e-43
## Abcg1         9.331727e-47  0.2795568 0.397 0.243  1.866345e-43
## Runx2         1.073765e-46 -0.6193470 0.880 0.681  2.147530e-43
## Col4a2        1.597588e-46  0.2638277 0.719 0.487  3.195176e-43
## Gm12216       3.702192e-45 -0.3254128 0.858 0.592  7.404384e-42
## C3            3.893130e-45 -0.6812377 0.887 0.614  7.786260e-42
## C4b           6.494481e-44 -0.7256890 0.903 0.787  1.298896e-40
## Rgs10         1.696006e-43 -0.3231683 0.802 0.481  3.392013e-40
## Tuba1c        2.058522e-43 -0.6436873 0.870 0.699  4.117044e-40
## Sema3a        2.629367e-43  0.4663564 0.595 0.333  5.258733e-40
## Sema5a        1.419674e-42 -0.3655227 0.826 0.542  2.839347e-39
## Ldb2          4.316098e-42  0.5729073 0.581 0.335  8.632196e-39
## Plin2         4.367413e-42  0.3414251 0.635 0.366  8.734826e-39
## Aldh2         6.413094e-42 -0.4337375 0.885 0.746  1.282619e-38
## Lrp4          8.785254e-42 -0.5468155 0.805 0.449  1.757051e-38
## Mt1           1.651877e-41 -0.6971176 0.907 0.831  3.303754e-38
## Nfkbid        9.309889e-41  0.2591168 0.606 0.361  1.861978e-37
## Emb           1.074049e-40 -0.3855190 0.828 0.490  2.148099e-37
## Slc43a3       3.644595e-40  0.3603688 0.618 0.365  7.289189e-37
## Tiparp        4.637996e-40  0.3100491 0.620 0.357  9.275993e-37
## Atpif1        1.247669e-39 -0.3083911 0.871 0.765  2.495338e-36
## Lockd         4.946630e-39 -0.5136655 0.601 0.273  9.893259e-36
## Prkcdbp       1.931017e-38  0.2718771 0.811 0.649  3.862034e-35
## Cyp1b1        2.892953e-38 -0.6650052 0.890 0.736  5.785905e-35
## Cd9           2.186744e-37 -0.2609237 0.960 0.902  4.373489e-34
## Plaur         6.238271e-37  0.2910260 0.435 0.300  1.247654e-33
## Slc3a2        1.605460e-36  0.2540287 0.763 0.563  3.210919e-33
```

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## Dpep1          4.074196e-36 -0.7049188 0.901 0.797  8.148392e-33
## Arap3          4.145027e-36  0.3947638 0.593 0.373  8.290054e-33
## Vdr            1.357503e-35 -0.5069548 0.867 0.519  2.715005e-32
## Fmo2           7.266180e-35 -0.6354016 0.870 0.577  1.453236e-31
## Mme            7.410928e-35 -0.6292502 0.876 0.707  1.482186e-31
## Cdkn1c         2.694416e-34  0.2786897 0.697 0.471  5.388832e-31
## Myct1          2.753641e-34  0.5285372 0.607 0.388  5.507283e-31
## Cadm1          4.239878e-34 -0.3677733 0.734 0.449  8.479756e-31
## Hmox1          8.339002e-34  0.3409678 0.629 0.385  1.667800e-30
## Mfng           1.228279e-33  0.4184430 0.580 0.366  2.456557e-30
## Mlec           6.067568e-33 -0.2921654 0.793 0.485  1.213514e-29
## Dcn            2.857213e-32 -0.6757200 0.870 0.697  5.714426e-29
## Ddit4          3.068318e-32  0.2576415 0.683 0.471  6.136635e-29
## Plxdc2         7.618323e-32 -0.5805021 0.884 0.725  1.523665e-28
## S100a10        1.532557e-30 -0.2844435 0.877 0.757  3.065113e-27
## Cxcl10         2.697132e-30  0.3407321 0.572 0.319  5.394264e-27
## Nucks1         2.763135e-30 -0.3937510 0.765 0.646  5.526270e-27
## Unc45b         2.936948e-30  0.4307437 0.577 0.352  5.873897e-27
## Kctd12         3.578270e-30 -0.3899945 0.864 0.776  7.156539e-27
## Tuba1a         6.852258e-30 -0.2998177 0.912 0.811  1.370452e-26
## Bambi          3.942304e-29  0.5418635 0.637 0.441  7.884608e-26
## Prrx1          8.581968e-29 -0.5420582 0.872 0.679  1.716394e-25
## Fam46a         3.938143e-28 -0.4278222 0.815 0.533  7.876286e-25
## Sat1           6.603756e-28  0.2539698 0.816 0.649  1.320751e-24
## Clmp           9.364645e-28 -0.4815355 0.852 0.672  1.872929e-24
## Stmn1          1.458638e-27 -0.7926006 0.521 0.395  2.917276e-24
## Grem1          1.220718e-26 -0.6490084 0.879 0.594  2.441436e-23
## Akap12         2.343113e-26  0.3573880 0.628 0.361  4.686227e-23
## Myzap          5.936074e-26  0.4171135 0.566 0.312  1.187215e-22
## Galnt18        6.748173e-26  0.5063793 0.533 0.244  1.349635e-22
## Cenpf          1.183311e-25 -0.3902279 0.513 0.167  2.366622e-22
## Tmem204        1.201557e-25  0.2853725 0.454 0.354  2.403115e-22
## Slc40a1        2.314061e-25 -0.3058681 0.793 0.517  4.628122e-22
## Ctsk           2.860831e-25 -0.4700987 0.846 0.665  5.721661e-22
## Hmgb1          4.830582e-25 -0.2678477 0.980 0.931  9.661164e-22
## Anxa1          5.398285e-24 -0.4504478 0.858 0.679  1.079657e-20
## Pdgfa          7.642043e-24 -0.3897243 0.851 0.570  1.528409e-20
## Anp32b         2.602078e-23 -0.3736679 0.850 0.728  5.204155e-20
## Cpxm1          4.508213e-23 -0.4270949 0.826 0.500  9.016426e-20
## Grrp1          5.159118e-23  0.5007371 0.582 0.373  1.031824e-19
## Gatm           8.628860e-23  0.2902682 0.449 0.294  1.725772e-19
## Gstt1          9.682758e-23 -0.5000644 0.841 0.530  1.936552e-19
## Car2           9.786875e-23  0.2786478 0.592 0.338  1.957375e-19
## Nr4a2          1.547003e-22  0.4288827 0.592 0.384  3.094005e-19
## Pth1r          1.255333e-21 -0.6778735 0.839 0.648  2.510667e-18
## Cxcl9          2.131133e-21  0.2878092 0.504 0.188  4.262265e-18
## Lpar6          1.012471e-20  0.3817419 0.547 0.284  2.024941e-17
## Ggt5           1.098046e-20 -0.6021954 0.870 0.665  2.196093e-17
## Mfap2          1.212861e-20 -0.3630554 0.783 0.486  2.425721e-17
## Sema7a         1.236071e-20 -0.4762815 0.865 0.565  2.472142e-17
## Cenpa          1.579424e-20 -0.3531847 0.544 0.255  3.158849e-17
## Ran            1.829784e-20 -0.2826553 0.836 0.729  3.659569e-17
## Pard6g         3.977088e-20 -0.2651599 0.746 0.479  7.954176e-17
## Cd200          4.610951e-20 -0.5156403 0.895 0.704  9.221903e-17
```

```
## Gstm1            1.691442e-19 -0.4660360 0.889 0.729  3.382885e-16
## Il13ra2          1.934405e-19  0.3694406 0.562 0.344  3.868810e-16
## Ltbp2            9.466672e-19 -0.4656078 0.873 0.623  1.893334e-15
## Plod2            1.308745e-18 -0.3019592 0.772 0.468  2.617489e-15
## Calcrl           1.698056e-18  0.4567023 0.526 0.264  3.396111e-15
## Mmp2             3.256472e-18 -0.3366401 0.757 0.483  6.512944e-15
## Cebpa            4.687185e-18 -0.3357877 0.875 0.598  9.374369e-15
## Gstm5            1.284022e-17 -0.3036883 0.800 0.521  2.568045e-14
## Gda              1.321152e-17  0.4527756 0.555 0.339  2.642304e-14
## Slfn5            7.141988e-17  0.2648560 0.577 0.321  1.428398e-13
## Cmtm8            2.105163e-16  0.5294172 0.551 0.311  4.210327e-13
## Top2a            5.785132e-16 -0.5031547 0.470 0.291  1.157026e-12
## H2afz            6.457121e-16 -0.5199261 0.932 0.848  1.291424e-12
## Hmgn2            7.421208e-16 -0.4100488 0.695 0.554  1.484242e-12
## Birc5            3.142195e-15 -0.4028306 0.572 0.289  6.284390e-12
## Itga6            7.966429e-15  0.3965415 0.465 0.304  1.593286e-11
## Apoe             1.366533e-14 -0.3318912 0.999 0.992  2.733066e-11
## Gpc1             2.007078e-14 -0.6279979 0.836 0.649  4.014156e-11
## Csrp2            2.588137e-14  0.3234030 0.609 0.402  5.176275e-11
## Id4              2.925958e-14 -0.3663624 0.825 0.559  5.851915e-11
## Htra1            3.713809e-14 -0.6323646 0.876 0.672  7.427619e-11
## C1s1             1.812484e-13 -0.5454943 0.887 0.603  3.624967e-10
## Timp1            2.036350e-13 -1.1123149 0.878 0.717  4.072700e-10
## Col8a1           7.010837e-13 -0.7328648 0.837 0.592  1.402167e-09
## Ogn              7.773540e-13 -0.6476450 0.848 0.629  1.554708e-09
## Ccnt1            7.811703e-13  0.2860850 0.625 0.423  1.562341e-09
## 1500009L16Rik    4.127502e-12 -0.6157407 0.891 0.737  8.255004e-09
## Palld            5.001760e-12 -0.2558906 0.794 0.525  1.000352e-08
## Mmp14            1.878018e-11 -0.3524421 0.843 0.680  3.756037e-08
## Gsn              3.399758e-11 -0.6201174 0.823 0.621  6.799516e-08
## Hpgd             5.999835e-11 -0.4636182 0.798 0.547  1.199967e-07
## Kng1             9.788336e-11 -0.6788694 0.891 0.699  1.957667e-07
## Rarres2          1.024255e-10 -0.4278732 0.936 0.831  2.048510e-07
## Crybb3           1.202527e-10  0.3032313 0.480 0.315  2.405055e-07
## Tpi1             1.770019e-10 -0.2946511 0.832 0.670  3.540037e-07
## Ghr              4.905511e-10 -0.4331440 0.880 0.694  9.811021e-07
## 1810011O10Rik    4.969941e-10  0.4846683 0.543 0.325  9.939881e-07
## Prkch            5.737997e-10  0.2822301 0.500 0.353  1.147599e-06
## Smc4             6.331025e-10 -0.3790103 0.615 0.340  1.266205e-06
## Slc39a8          1.119744e-09  0.3022894 0.484 0.354  2.239488e-06
## Fst              1.356382e-09 -0.5298978 0.882 0.636  2.712764e-06
## Alpl             1.809759e-09 -1.0406310 0.815 0.613  3.619518e-06
## Fabp5            2.236510e-09  0.2830858 0.531 0.316  4.473020e-06
## Lbp              2.538030e-09 -0.3795332 0.873 0.655  5.076060e-06
## Stk17b           2.915143e-09 -0.4202369 0.839 0.549  5.830285e-06
## Fzd4             5.733966e-09  0.3214378 0.540 0.323  1.146793e-05
## Pdzd2            7.827734e-09  0.4184475 0.456 0.300  1.565547e-05
## Emp1             7.828241e-09 -0.2615933 0.893 0.745  1.565648e-05
## Mcam             1.181099e-08  0.3818381 0.455 0.258  2.362197e-05
## Ptgs1            1.830151e-08  0.4304729 0.544 0.359  3.660302e-05
## Nnmt             2.277026e-08 -0.4602928 0.854 0.584  4.554051e-05
## Sdc4             2.646661e-08 -0.3117480 0.839 0.562  5.293322e-05
## H2-Q10           2.689744e-08 -0.6070201 0.893 0.726  5.379489e-05
## Bmp1             3.565615e-08 -0.5173295 0.844 0.662  7.131229e-05
```

```
## Adgrg1            5.511107e-08   0.4409084 0.561 0.363   1.102221e-04
## Procr             5.687017e-08   0.3344451 0.452 0.272   1.137403e-04
## Gsr               7.215357e-08  -0.4475368 0.859 0.689   1.443071e-04
## Cks2              7.359835e-08  -0.4833295 0.590 0.328   1.471967e-04
## Fbn1              2.058417e-07  -0.5518579 0.862 0.622   4.116835e-04
## Ccdc80            2.317390e-07  -0.6030368 0.791 0.540   4.634780e-04
## Slit2             2.320104e-07  -0.4847505 0.793 0.539   4.640209e-04
## Emp2              2.388406e-07  -0.5665910 0.883 0.690   4.776812e-04
## Chrdl1            2.728188e-07  -0.6763715 0.900 0.717   5.456377e-04
## Enpp6             6.759999e-07   0.3421617 0.522 0.305   1.352000e-03
## Upp1              7.799966e-07   0.3888200 0.550 0.345   1.559993e-03
## Enc1              1.303011e-06   0.3019758 0.481 0.316   2.606022e-03
## Il34              1.530078e-06  -0.6869753 0.881 0.646   3.060155e-03
## Sox18             1.589254e-06   0.3722707 0.522 0.302   3.178507e-03
## Ifi203            2.263608e-06   0.2654402 0.554 0.367   4.527215e-03
## Kng2              3.183507e-06  -0.6427832 0.891 0.692   6.367015e-03
## Serpinf1          3.718945e-06  -0.2877905 0.856 0.685   7.437891e-03
## Hmgb2             5.242746e-06  -0.9134532 0.754 0.593   1.048549e-02
## Gata2             5.563616e-06   0.3174337 0.486 0.290   1.112723e-02
## Noct              7.933522e-06   0.2733666 0.517 0.285   1.586704e-02
## Ccdc34            9.186874e-06  -0.4500450 0.755 0.571   1.837375e-02
## Steap4            1.163975e-05  -0.4593114 0.874 0.650   2.327951e-02
## Ube2c             1.254721e-05  -0.4099022 0.556 0.288   2.509443e-02
## 2810417H13Rik     1.759897e-05  -0.4599839 0.522 0.245   3.519794e-02
## Cotl1             1.766356e-05   0.2683038 0.613 0.439   3.532712e-02
## Arrdc4            1.999172e-05  -0.5094365 0.874 0.654   3.998345e-02
## Itgb5             2.236669e-05  -0.5434494 0.856 0.580   4.473339e-02
## Pmepa1            2.950277e-05  -0.4391831 0.850 0.578   5.900553e-02
## Slc9a3r2          3.627382e-05   0.3135532 0.560 0.365   7.254763e-02
## Ank               4.146326e-05  -0.2675905 0.641 0.408   8.292653e-02
## Trib1             5.900703e-05   0.2768353 0.524 0.308   1.180141e-01
## Tubb5             5.927729e-05  -0.2950530 0.883 0.764   1.185546e-01
## Phlda3            6.468127e-05  -0.4077090 0.833 0.641   1.293625e-01
## Cyr61             8.918740e-05  -0.6019464 0.881 0.660   1.783748e-01
## Cdc42ep3          2.471043e-04  -0.3690881 0.841 0.654   4.942086e-01
## Ctla2b            3.817405e-04   0.3516982 0.509 0.268   7.634809e-01
## Podnl1            4.740938e-04  -0.4934670 0.834 0.535   9.481876e-01
## Rasgef1b          5.263255e-04   0.2895544 0.496 0.336   1.000000e+00
## Arhgap29          8.990254e-04   0.3439158 0.489 0.233   1.000000e+00
## Tmem88            9.708792e-04   0.4973144 0.521 0.321   1.000000e+00
## Wisp2             1.315746e-03  -0.9545161 0.886 0.686   1.000000e+00
## Rnd1              1.326061e-03   0.3182032 0.542 0.372   1.000000e+00
## Ptpn18            1.336925e-03   0.3340564 0.516 0.281   1.000000e+00
## Sema6a            1.408229e-03   0.4234396 0.527 0.314   1.000000e+00
## Hist1h2bc         2.750294e-03  -0.4244370 0.859 0.657   1.000000e+00
## Ncam1             2.792014e-03  -0.5488431 0.780 0.516   1.000000e+00
## Cav2              3.297495e-03   0.2786339 0.454 0.190   1.000000e+00
## Mt2               3.550036e-03  -1.0599879 0.879 0.697   1.000000e+00
## Gmfg              4.036544e-03   0.3369789 0.549 0.352   1.000000e+00
## Hvcn1             4.043804e-03  -0.5705480 0.890 0.665   1.000000e+00
## Cd55              4.334057e-03   0.2558888 0.537 0.374   1.000000e+00
## Myl9              4.510966e-03  -0.5197543 0.818 0.546   1.000000e+00
## Pcdh17            4.829599e-03   0.4178992 0.490 0.308   1.000000e+00
## Trf               6.079837e-03  -0.5260039 0.927 0.760   1.000000e+00
```

```
## Srpx             6.402994e-03 -0.4690688 0.840 0.614  1.000000e+00
## Cdca3            7.688225e-03 -0.2749313 0.496 0.258  1.000000e+00
## Plxna2           8.723288e-03 -0.3374059 0.793 0.563  1.000000e+00
## Hbegf            1.109068e-02  0.2944191 0.494 0.319  1.000000e+00
## Gas1             1.114244e-02 -0.6536641 0.872 0.625  1.000000e+00
## Igf1             1.343661e-02 -0.5129001 0.827 0.572  1.000000e+00
## Tmcc3            1.415093e-02  0.3589646 0.493 0.321  1.000000e+00
## Snhg18           1.416945e-02 -0.3486686 0.832 0.597  1.000000e+00
## Grasp            1.745098e-02  0.2687199 0.479 0.290  1.000000e+00
## Fat1             1.872995e-02 -0.5551414 0.834 0.606  1.000000e+00
## Slc6a6           2.064837e-02 -0.4874064 0.871 0.652  1.000000e+00
## Sdc1             2.779373e-02 -0.4875282 0.863 0.657  1.000000e+00
## Col5a2           3.140056e-02 -0.2713117 0.836 0.581  1.000000e+00
## Cd34             3.360367e-02  0.2545314 0.478 0.191  1.000000e+00
## Spint2           3.838424e-02  0.3258266 0.502 0.301  1.000000e+00
## Crem             4.740714e-02  0.2941201 0.530 0.327  1.000000e+00
## Errfi1           5.951385e-02 -0.4295445 0.845 0.585  1.000000e+00
## F2r              7.272502e-02  0.4392564 0.471 0.279  1.000000e+00
## Cd1d1            8.493795e-02 -0.3852574 0.867 0.629  1.000000e+00
## Egr1             9.277641e-02 -0.4510773 0.843 0.689  1.000000e+00
## Serpinb6b        9.282467e-02  0.4000476 0.523 0.311  1.000000e+00
## Lmna             1.029505e-01 -0.2841312 0.823 0.577  1.000000e+00
## Tm6sf1           1.347143e-01  0.3330234 0.484 0.266  1.000000e+00
## Txndc5           1.443626e-01 -0.2991969 0.845 0.614  1.000000e+00
## Gimap1           1.802443e-01  0.2789661 0.545 0.357  1.000000e+00
## Slco2a1          1.828845e-01  0.4190233 0.454 0.226  1.000000e+00
## Cks1b            2.910133e-01 -0.3823445 0.619 0.399  1.000000e+00
## H2-Q6            3.200782e-01 -0.2527755 0.756 0.540  1.000000e+00
## Lrrc32           3.213135e-01  0.3046757 0.499 0.318  1.000000e+00
## Tpm2             3.326628e-01 -0.5333976 0.820 0.568  1.000000e+00
## Lgals3bp         3.544624e-01 -0.3965236 0.872 0.653  1.000000e+00
## Ly6c1            3.694974e-01  0.9576362 0.539 0.414  1.000000e+00
## Il2rg            3.766783e-01  0.3345549 0.527 0.346  1.000000e+00
## Lpl              4.032656e-01 -0.5043976 0.919 0.769  1.000000e+00
## Pmp22            4.102993e-01 -0.3504506 0.877 0.666  1.000000e+00
## Ltbp1            4.209882e-01 -0.5426145 0.873 0.625  1.000000e+00
## Gchfr            4.971271e-01  0.2854164 0.455 0.185  1.000000e+00
## 2200002D01Rik    5.242793e-01  0.4697368 0.501 0.346  1.000000e+00
## Samhd1           5.351929e-01 -0.3088461 0.858 0.627  1.000000e+00
## Pam              6.966058e-01 -0.2570389 0.827 0.627  1.000000e+00
## Shox2            7.020698e-01 -0.5342990 0.830 0.557  1.000000e+00
## Gpm6b            7.942765e-01 -0.5915259 0.872 0.644  1.000000e+00
## Gimap5           8.036834e-01  0.3314540 0.551 0.396  1.000000e+00
## Igfbp2           8.970157e-01  0.4877140 0.471 0.252  1.000000e+00
## Ckb              9.817346e-01 -0.2598829 0.807 0.607  1.000000e+00
```

real-world data 3: Baryawno_2019

paper name: A Cellular Taxonomy of the Bone Marrow Stroma in Homeostasis and Leukemia

Read data

filter out cluster 10 since there is only 1 observation of cluster 10. Filter out cluster 10 and cluster 14 since they are not in the original results

Get matrices

```
##      cluster truth betabin_wMU_pvals betabin_wMU_Res
## 1   cluster0     P        0.43225426                N
## 2   cluster1     N        0.35122351                N
## 3  cluster11     N        0.50238282                N
## 4  cluster12     N        0.33453463                N
## 5  cluster13     N        0.97646179                N
## 6  cluster15     P        0.19330695                N
## 7  cluster16     N        0.96477370                N
## 8  cluster17     N        0.98137142                N
## 9   cluster2     P        0.07182271                N
## 10  cluster3     N        0.26445513                N
## 11  cluster4     P        0.01134226                P
## 12  cluster5     P        0.21714401                N
## 13  cluster6     P        0.22996026                N
## 14  cluster7     P        0.07525342                N
## 15  cluster8     P        0.66732838                N
## 16  cluster9     N        0.46031010                N

##                      p_val avg_log2FC pct.1 pct.2     p_val_adj
## Rpl7        0.000000e+00   0.3340186 0.978 0.904  0.000000e+00
## Rpl31       0.000000e+00   0.2832334 0.980 0.924  0.000000e+00
## Fhl2        0.000000e+00  -1.4014029 0.132 0.437  0.000000e+00
## Eef1b2      0.000000e+00   0.6064830 0.805 0.575  0.000000e+00
## Fn1         0.000000e+00   1.1545927 0.371 0.145  0.000000e+00
## Rpl37a      0.000000e+00   0.2669819 0.994 0.966  0.000000e+00
## Igfbp5      0.000000e+00  -1.3585437 0.392 0.800  0.000000e+00
## Serpine2    0.000000e+00  -1.0777393 0.497 0.891  0.000000e+00
## Col6a3      0.000000e+00   1.0932053 0.281 0.079  0.000000e+00
## Bok         0.000000e+00   1.1187281 0.333 0.107  0.000000e+00
## Fmo2        0.000000e+00  -1.4966233 0.068 0.315  0.000000e+00
## Marc1       0.000000e+00  -1.4376560 0.045 0.259  0.000000e+00
## Cd34        0.000000e+00   1.0230279 0.306 0.096  0.000000e+00
## Plxdc2      0.000000e+00  -1.0926059 0.235 0.518  0.000000e+00
## Il1rn       0.000000e+00  -2.0165131 0.029 0.306  0.000000e+00
## Egfl7       0.000000e+00   1.7723334 0.501 0.109  0.000000e+00
## Eng         0.000000e+00   1.2766692 0.465 0.173  0.000000e+00
## Zeb2        0.000000e+00  -1.3024025 0.289 0.618  0.000000e+00
## Cd302       0.000000e+00  -0.9612628 0.452 0.711  0.000000e+00
## Rbms1       0.000000e+00  -0.6821498 0.557 0.740  0.000000e+00
## Tfpi        0.000000e+00   1.8259763 0.387 0.094  0.000000e+00
## Serping1    0.000000e+00  -1.5022244 0.332 0.811  0.000000e+00
## Mdk         0.000000e+00  -1.4094829 0.104 0.365  0.000000e+00
## Trp53i11    0.000000e+00   1.2598456 0.254 0.060  0.000000e+00
## Grem1       0.000000e+00  -2.0162157 0.047 0.351  0.000000e+00
## Fbn1        0.000000e+00  -1.2645128 0.121 0.371  0.000000e+00
## Fgf7        0.000000e+00  -1.6347885 0.068 0.366  0.000000e+00
## Cd93        0.000000e+00   1.3688684 0.355 0.085  0.000000e+00
## Cst3        0.000000e+00  -0.3028459 0.923 0.988  0.000000e+00
## Fkbp1a      0.000000e+00   0.5498645 0.795 0.585  0.000000e+00
## Samhd1      0.000000e+00  -1.1185059 0.193 0.431  0.000000e+00
## Wisp2       0.000000e+00  -1.6003388 0.203 0.563  0.000000e+00
## Cebpb       0.000000e+00  -0.7508709 0.553 0.740  0.000000e+00
## Rps21       0.000000e+00   0.3999875 0.961 0.856  0.000000e+00
## Tspan7      0.000000e+00   1.1688897 0.264 0.066  0.000000e+00
```

```
## Bgn          0.000000e+00 -0.4840461 0.767 0.892  0.000000e+00
## Gdpd2        0.000000e+00 -2.1815808 0.108 0.604  0.000000e+00
## Rps4x        0.000000e+00  0.2636380 0.983 0.949  0.000000e+00
## Rpl36a       0.000000e+00  0.3739998 0.948 0.851  0.000000e+00
## Chrdl1       0.000000e+00 -2.0853848 0.069 0.455  0.000000e+00
## Gpm6b        0.000000e+00 -1.4368145 0.089 0.364  0.000000e+00
## Fabp4        0.000000e+00  1.0080291 0.568 0.372  0.000000e+00
## Cp           0.000000e+00 -1.1675081 0.219 0.549  0.000000e+00
## Spry1        0.000000e+00 -1.3333435 0.197 0.500  0.000000e+00
## Lhfp         0.000000e+00 -1.0058579 0.309 0.617  0.000000e+00
## Ptx3         0.000000e+00 -1.9806028 0.052 0.360  0.000000e+00
## S100a11      0.000000e+00 -0.5032080 0.731 0.891  0.000000e+00
## Igsf3        0.000000e+00 -1.4299125 0.152 0.480  0.000000e+00
## Csf1         0.000000e+00 -1.2672052 0.177 0.450  0.000000e+00
## Rpl34        0.000000e+00  0.2875368 0.976 0.927  0.000000e+00
## Emcn         0.000000e+00  1.6263462 0.371 0.067  0.000000e+00
## Cyr61        0.000000e+00 -1.0770126 0.461 0.754  0.000000e+00
## Adgrl4       0.000000e+00  1.1945744 0.253 0.050  0.000000e+00
## Rps20        0.000000e+00  0.2808815 0.975 0.922  0.000000e+00
## Svep1        0.000000e+00 -1.5383136 0.048 0.295  0.000000e+00
## Pappa        0.000000e+00 -2.2600102 0.047 0.442  0.000000e+00
## Ptprd        0.000000e+00 -1.2119643 0.154 0.426  0.000000e+00
## Rps6         0.000000e+00  0.2990721 0.981 0.921  0.000000e+00
## Jun          0.000000e+00 -0.5222747 0.863 0.931  0.000000e+00
## Lepr         0.000000e+00 -2.0722426 0.097 0.541  0.000000e+00
## Plpp3        0.000000e+00 -0.6063356 0.579 0.774  0.000000e+00
## Fam167b      0.000000e+00  2.0851213 0.309 0.015  0.000000e+00
## Rpl11        0.000000e+00  0.2743174 0.965 0.898  0.000000e+00
## Hspg2        0.000000e+00  1.0292682 0.448 0.170  0.000000e+00
## Errfi1       0.000000e+00 -1.1325411 0.325 0.627  0.000000e+00
## Rpl22        0.000000e+00  0.4607028 0.917 0.759  0.000000e+00
## Mmp23        0.000000e+00 -1.3521205 0.098 0.342  0.000000e+00
## Steap4       0.000000e+00 -1.4909502 0.064 0.312  0.000000e+00
## Cd36         0.000000e+00  1.0562945 0.285 0.082  0.000000e+00
## Gm1673       0.000000e+00  1.8703579 0.317 0.038  0.000000e+00
## Kdr          0.000000e+00  1.8196047 0.364 0.048  0.000000e+00
## Spp1         0.000000e+00 -0.7439339 0.437 0.733  0.000000e+00
## Rpl5         0.000000e+00  0.4448907 0.873 0.708  0.000000e+00
## Fam69a       0.000000e+00 -1.4227999 0.078 0.322  0.000000e+00
## Serpine1     0.000000e+00 -1.2148511 0.239 0.470  0.000000e+00
## Flt1         0.000000e+00  1.4525451 0.332 0.064  0.000000e+00
## Rarres2      0.000000e+00 -1.2963490 0.309 0.694  0.000000e+00
## Gimap6       0.000000e+00  1.1339409 0.304 0.083  0.000000e+00
## Tmem176b     0.000000e+00 -0.8911304 0.635 0.847  0.000000e+00
## Tmem176a     0.000000e+00 -0.9072643 0.528 0.783  0.000000e+00
## Aqp1         0.000000e+00  1.2735104 0.466 0.130  0.000000e+00
## Mgll         0.000000e+00  1.0067961 0.298 0.091  0.000000e+00
## Slc6a6       0.000000e+00 -1.1393710 0.357 0.693  0.000000e+00
## Cxcl12       0.000000e+00 -1.5194366 0.613 0.919  0.000000e+00
## Apold1       0.000000e+00  1.5896559 0.332 0.062  0.000000e+00
## Mgp          0.000000e+00 -0.9707807 0.616 0.875  0.000000e+00
## Abcc9        0.000000e+00  1.4192649 0.252 0.042  0.000000e+00
## Rps9         0.000000e+00  0.2574810 0.972 0.926  0.000000e+00
## Rpl28        0.000000e+00  0.2982058 0.971 0.903  0.000000e+00
```

```
## Slc1a5          0.000000e+00 -1.2885596 0.226 0.527  0.000000e+00
## Fosb            0.000000e+00 -0.6040271 0.689 0.826  0.000000e+00
## Apoe            0.000000e+00 -0.7989627 0.664 0.856  0.000000e+00
## Ltbp4           0.000000e+00  1.0923026 0.297 0.093  0.000000e+00
## Zfp36           0.000000e+00 -0.6970956 0.685 0.829  0.000000e+00
## Fxyd5           0.000000e+00  0.8676926 0.550 0.268  0.000000e+00
## Cebpa           0.000000e+00 -1.8585387 0.137 0.539  0.000000e+00
## Arrdc4          0.000000e+00 -1.4961974 0.184 0.520  0.000000e+00
## Rps17           0.000000e+00  0.2986836 0.978 0.916  0.000000e+00
## Prcp            0.000000e+00  1.0842067 0.298 0.088  0.000000e+00
## Rps3            0.000000e+00  0.3610437 0.978 0.920  0.000000e+00
## Rps13           0.000000e+00  0.2649201 0.977 0.924  0.000000e+00
## Rps15a          0.000000e+00  0.2722475 0.982 0.942  0.000000e+00
## Nupr1           0.000000e+00 -0.6440659 0.558 0.771  0.000000e+00
## Ebf3            0.000000e+00 -2.0732197 0.077 0.490  0.000000e+00
## Rplp2           0.000000e+00  0.2981632 0.978 0.910  0.000000e+00
## Bicc1           0.000000e+00 -1.3521927 0.184 0.506  0.000000e+00
## Ggt5            0.000000e+00 -1.4183760 0.053 0.273  0.000000e+00
## Rps15           0.000000e+00  0.2652177 0.980 0.931  0.000000e+00
## 1500009L16Rik   0.000000e+00 -2.4023342 0.082 0.591  0.000000e+00
## Timp3           0.000000e+00  1.1045488 0.699 0.297  0.000000e+00
## Stab2           0.000000e+00  2.0710523 0.262 0.007  0.000000e+00
## Elk3            0.000000e+00  1.0738668 0.340 0.116  0.000000e+00
## Nudt4           0.000000e+00 -0.8976540 0.367 0.617  0.000000e+00
## Kitl            0.000000e+00 -1.8677853 0.145 0.618  0.000000e+00
## Ptprb           0.000000e+00  1.6511704 0.355 0.058  0.000000e+00
## Gas6            0.000000e+00 -1.3597278 0.449 0.838  0.000000e+00
## Csmd1           0.000000e+00 -1.7505676 0.062 0.370  0.000000e+00
## Vegfc           0.000000e+00 -1.3161443 0.106 0.375  0.000000e+00
## Lpl             0.000000e+00 -2.1098248 0.161 0.676  0.000000e+00
## Jund            0.000000e+00 -0.4374778 0.909 0.958  0.000000e+00
## Rpl18a          0.000000e+00  0.2628511 0.993 0.962  0.000000e+00
## Plvap           0.000000e+00  2.2862842 0.450 0.042  0.000000e+00
## Junb            0.000000e+00 -0.3880121 0.875 0.925  0.000000e+00
## Mt2             0.000000e+00 -0.9209098 0.474 0.759  0.000000e+00
## Mt1             0.000000e+00 -0.8410734 0.592 0.843  0.000000e+00
## Cdh11           0.000000e+00 -1.4956576 0.164 0.527  0.000000e+00
## Cdh5            0.000000e+00  1.7523777 0.440 0.078  0.000000e+00
## Hp              0.000000e+00 -1.9471718 0.378 0.799  0.000000e+00
## Il34            0.000000e+00 -2.1959342 0.056 0.462  0.000000e+00
## Dpep1           0.000000e+00 -2.1535957 0.078 0.539  0.000000e+00
## Agt             0.000000e+00 -1.6093387 0.049 0.300  0.000000e+00
## Nrp1            0.000000e+00 -0.8145988 0.401 0.654  0.000000e+00
## Rps24           0.000000e+00  0.2772448 0.987 0.949  0.000000e+00
## Stab1           0.000000e+00  1.5721539 0.264 0.032  0.000000e+00
## Mmrn2           0.000000e+00  1.5671559 0.338 0.057  0.000000e+00
## Clu             0.000000e+00 -0.8693731 0.263 0.554  0.000000e+00
## Mycbp2          0.000000e+00 -1.1291413 0.286 0.553  0.000000e+00
## Gpc6            0.000000e+00 -1.3180463 0.098 0.317  0.000000e+00
## Smco4           0.000000e+00  1.0702486 0.335 0.112  0.000000e+00
## Esam            0.000000e+00  1.2912207 0.366 0.091  0.000000e+00
## Rps25           0.000000e+00  0.3388787 0.978 0.907  0.000000e+00
## Nnmt            0.000000e+00 -1.4287354 0.086 0.339  0.000000e+00
## Rplp1           0.000000e+00  0.2637681 0.987 0.951  0.000000e+00
```

```
## Rpl4           0.000000e+00   0.3344624 0.943 0.846   0.000000e+00
## Tpm1           0.000000e+00  -0.7569512 0.519 0.731   0.000000e+00
## Rbp1           0.000000e+00   1.1164465 0.301 0.106   0.000000e+00
## Trf            0.000000e+00  -1.7860312 0.258 0.605   0.000000e+00
## Ackr4          0.000000e+00  -1.3578384 0.064 0.278   0.000000e+00
## Rpl29          0.000000e+00   0.3147130 0.941 0.851   0.000000e+00
## Tns3           0.000000e+00  -1.1839060 0.262 0.556   0.000000e+00
## Rps27a         0.000000e+00   0.2526703 0.987 0.951   0.000000e+00
## Ebf1           0.000000e+00  -0.9878748 0.453 0.818   0.000000e+00
## Ltc4s          0.000000e+00   1.6656598 0.261 0.028   0.000000e+00
## Adamts2        0.000000e+00  -1.0796174 0.207 0.472   0.000000e+00
## Gpx3           0.000000e+00  -0.8953803 0.581 0.894   0.000000e+00
## Atox1          0.000000e+00   0.6218194 0.809 0.583   0.000000e+00
## Rpl26          0.000000e+00   0.2719377 0.987 0.945   0.000000e+00
## Rpl23          0.000000e+00   0.3413731 0.986 0.940   0.000000e+00
## Igfbp4         0.000000e+00  -0.7787287 0.705 0.870   0.000000e+00
## Ramp2          0.000000e+00   1.1230280 0.527 0.227   0.000000e+00
## Cd300lg        0.000000e+00   1.1018110 0.269 0.074   0.000000e+00
## Icam2          0.000000e+00   1.3775114 0.276 0.052   0.000000e+00
## Pecam1         0.000000e+00   1.0588209 0.464 0.194   0.000000e+00
## Rpl38          0.000000e+00   0.3470126 0.942 0.836   0.000000e+00
## Cygb           0.000000e+00  -1.4560905 0.132 0.454   0.000000e+00
## Socs3          0.000000e+00  -0.5384352 0.679 0.797   0.000000e+00
## Klf6           0.000000e+00  -0.8685096 0.552 0.764   0.000000e+00
## Sfrp4          0.000000e+00  -1.4366975 0.149 0.507   0.000000e+00
## Foxc1          0.000000e+00  -1.3163990 0.206 0.507   0.000000e+00
## Serpinb6a      0.000000e+00   0.7767657 0.622 0.351   0.000000e+00
## Phactr1        0.000000e+00  -1.4711696 0.048 0.279   0.000000e+00
## S1pr3          0.000000e+00  -1.9954178 0.074 0.437   0.000000e+00
## Cxcl14         0.000000e+00  -2.0551234 0.288 0.819   0.000000e+00
## Mef2c          0.000000e+00   0.9422592 0.419 0.174   0.000000e+00
## Plk2           0.000000e+00   1.0552934 0.255 0.073   0.000000e+00
## Plpp1          0.000000e+00   1.3020215 0.443 0.148   0.000000e+00
## Gpx8           0.000000e+00  -1.2048664 0.260 0.578   0.000000e+00
## Esm1           0.000000e+00  -2.7718114 0.094 0.709   0.000000e+00
## Fst            0.000000e+00  -2.2186074 0.111 0.617   0.000000e+00
## Rps7           0.000000e+00   0.3611717 0.953 0.855   0.000000e+00
## Rps29          0.000000e+00   0.3246037 0.972 0.898   0.000000e+00
## Ltbp2          0.000000e+00  -1.3518766 0.096 0.329   0.000000e+00
## Fos            0.000000e+00  -0.3575261 0.898 0.938   0.000000e+00
## Fbln5          0.000000e+00  -1.3532237 0.268 0.666   0.000000e+00
## Lgmn           0.000000e+00   1.2347426 0.472 0.193   0.000000e+00
## Serpina12      0.000000e+00  -2.0924791 0.033 0.339   0.000000e+00
## Serpina3g      0.000000e+00  -1.6579453 0.133 0.465   0.000000e+00
## Serpina3n      0.000000e+00  -1.8775858 0.062 0.398   0.000000e+00
## Ghr            0.000000e+00  -1.5768867 0.199 0.564   0.000000e+00
## Rpl37          0.000000e+00   0.2924088 0.982 0.923   0.000000e+00
## Rpl30          0.000000e+00   0.3513335 0.965 0.871   0.000000e+00
## Ly6a           0.000000e+00   1.2639628 0.567 0.214   0.000000e+00
## Ly6c1          0.000000e+00   1.3169612 0.515 0.160   0.000000e+00
## Gpihbp1        0.000000e+00   1.6766660 0.388 0.070   0.000000e+00
## Pdzrn4         0.000000e+00  -1.9626055 0.026 0.305   0.000000e+00
## Cldn5          0.000000e+00   2.0312378 0.437 0.067   0.000000e+00
## Kng2           0.000000e+00  -2.4793962 0.043 0.517   0.000000e+00
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## Kng1        0.000000e+00  -2.2580464  0.027  0.414   0.000000e+00
## Adipoq      0.000000e+00  -2.7433058  0.048  0.552   0.000000e+00
## Rpl35a      0.000000e+00   0.2830571  0.989  0.949   0.000000e+00
## Mylk        0.000000e+00  -1.0741471  0.201  0.439   0.000000e+00
## Fstl1       0.000000e+00  -1.3320668  0.317  0.724   0.000000e+00
## Gm9843      0.000000e+00   0.4777589  0.894  0.709   0.000000e+00
## Cyyr1       0.000000e+00   1.2422962  0.265  0.059   0.000000e+00
## Runx1       0.000000e+00  -1.5827516  0.232  0.639   0.000000e+00
## Rps10       0.000000e+00   0.2926922  0.965  0.898   0.000000e+00
## Notch3      0.000000e+00  -1.7046330  0.039  0.298   0.000000e+00
## Rps28       0.000000e+00   0.4503821  0.883  0.723   0.000000e+00
## H2-K1       0.000000e+00  -0.5796359  0.738  0.889   0.000000e+00
## C4b         0.000000e+00  -1.8643804  0.130  0.554   0.000000e+00
## H2-D1       0.000000e+00  -0.3729531  0.921  0.960   0.000000e+00
## H2-Q10      0.000000e+00  -1.8613731  0.080  0.430   0.000000e+00
## Lrg1        0.000000e+00   1.3816463  0.422  0.178   0.000000e+00
## Cyp1b1      0.000000e+00  -2.0909671  0.141  0.644   0.000000e+00
## Egr1        0.000000e+00  -0.7684554  0.592  0.814   0.000000e+00
## Ecscr       0.000000e+00   1.2159857  0.340  0.103   0.000000e+00
## Lox         0.000000e+00  -1.2272424  0.168  0.447   0.000000e+00
## Gm4951      0.000000e+00  -1.3743120  0.098  0.338   0.000000e+00
## Rps14       0.000000e+00   0.2649669  0.993  0.967   0.000000e+00
## Pdgfrb      0.000000e+00  -1.6079056  0.191  0.595   0.000000e+00
## Rpl17       0.000000e+00   0.2688445  0.984  0.941   0.000000e+00
## Ms4a4d      0.000000e+00  -1.7105442  0.031  0.299   0.000000e+00
## Neat1       2.764176e-307 -0.5112505  0.685  0.812   7.739140e-303
## S100a4      7.030819e-307  1.1337302  0.326  0.121   1.968489e-302
## Msn         2.176485e-302  0.7647430  0.547  0.291   6.093723e-298
## Loxl1       7.103965e-302 -1.0297511  0.178  0.420   1.988968e-297
## C1s1        2.845350e-300 -1.2154532  0.091  0.310   7.966412e-296
## Fam46a      6.896522e-299 -1.0543965  0.213  0.443   1.930888e-294
## Rpl12       1.611444e-297  0.3272061  0.926  0.827   4.511721e-293
## Amotl2      1.785296e-295 -1.1507311  0.162  0.385   4.998471e-291
## Id1         1.072186e-294  0.7839035  0.582  0.343   3.001907e-290
## Lmo4        6.283311e-291 -0.8678940  0.325  0.535   1.759201e-286
## Myl9        4.225446e-290 -1.3285904  0.098  0.311   1.183040e-285
## Dab2        2.029783e-284  0.9422785  0.351  0.146   5.682987e-280
## C1ra        2.837101e-282 -1.1439672  0.114  0.329   7.943317e-278
## Zfp36l1     3.194752e-281 -0.4588782  0.730  0.810   8.944668e-277
## Ubc         1.078710e-280 -0.3238020  0.868  0.908   3.020173e-276
## Mrps6       1.933889e-280 -1.1083688  0.155  0.369   5.414503e-276
## Tnc         1.664288e-277 -0.9116356  0.190  0.444   4.659674e-273
## Slc5a3      1.767787e-277 -1.2978471  0.084  0.283   4.949451e-273
## Ets2        2.819216e-277  0.9532463  0.276  0.095   7.893240e-273
## Bvht        5.290700e-276  0.9925409  0.283  0.102   1.481290e-271
## Thbd        1.913594e-275  0.9883306  0.356  0.156   5.357680e-271
## Rbms3       1.186369e-274 -1.2288739  0.089  0.290   3.321597e-270
## Vcam1       1.578912e-274 -0.8280903  0.307  0.541   4.420639e-270
## Ninj1       1.365305e-273  0.8317502  0.401  0.182   3.822581e-269
## Sdc1        5.779339e-271 -1.1260876  0.121  0.330   1.618099e-266
## Rpl36       2.536640e-270  0.2547698  0.966  0.903   7.102085e-266
## Rasl11a     7.026318e-270 -1.1627886  0.143  0.358   1.967229e-265
## Ap2s1       5.054716e-268  0.7162835  0.572  0.344   1.415219e-263
## Cox7a2l     7.017735e-267  0.5252692  0.766  0.550   1.964825e-262
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## Klf9        8.895557e-267 -0.5795949 0.527 0.714 2.490578e-262
## Clmp        1.010502e-266 -0.9933880 0.186 0.404 2.829203e-262
## Id4         1.556554e-266 -1.0481962 0.211 0.424 4.358039e-262
## Deptor      8.139635e-266 -1.1610899 0.121 0.327 2.278935e-261
## Naca        1.022509e-265  0.3752108 0.884 0.742 2.862822e-261
## Gnb2l1      9.980606e-263  0.3901704 0.866 0.717 2.794370e-258
## Cyb5r3      1.459211e-262  0.7556768 0.447 0.214 4.085499e-258
## Col8a1      3.262591e-259 -1.1055299 0.129 0.338 9.134603e-255
## Capg        3.307057e-256  0.8181148 0.378 0.168 9.259099e-252
## S100a13     1.087905e-255  0.5043652 0.779 0.576 3.045917e-251
## Ndrg1       7.039907e-254  0.7879049 0.433 0.212 1.971033e-249
## Col1a2      3.010935e-250 -0.5784652 0.416 0.737 8.430015e-246
## Cldn10      9.336446e-250 -1.1585851 0.097 0.294 2.614018e-245
## Tm4sf1      1.796799e-249  0.7395632 0.574 0.349 5.030679e-245
## Gm10073     1.898297e-248  0.5300763 0.732 0.528 5.314852e-244
## Cd1d1       2.182496e-246 -1.1742226 0.086 0.272 6.110551e-242
## Snx5        3.083293e-246  0.8126545 0.320 0.131 8.632604e-242
## Prss23      7.225152e-246 -0.8584613 0.248 0.465 2.022898e-241
## H2-Q7       9.354665e-245 -0.7339247 0.341 0.552 2.619119e-240
## Mafb        1.884571e-244  0.7431826 0.525 0.312 5.276421e-240
## Epdr1       1.320910e-243 -0.8330974 0.234 0.450 3.698283e-239
## Ly6e        1.252885e-242  0.6453827 0.639 0.465 3.507828e-238
## Igfbp7      1.780419e-242 -0.2523239 0.907 0.972 4.984817e-238
## Rps26       4.469814e-239  0.4063245 0.858 0.694 1.251458e-234
## Ets1        5.813954e-239  0.8324671 0.416 0.218 1.627791e-234
## Fgfr2       8.514955e-239 -1.0970960 0.116 0.308 2.384017e-234
## Tcf4        3.299416e-235  0.5837701 0.669 0.446 9.237704e-231
## Pid1        1.793275e-234 -1.0612214 0.149 0.343 5.020811e-230
## Sdpr        2.549241e-234  0.8146660 0.283 0.106 7.137365e-230
## Cmtm3       2.239636e-232  0.8099040 0.360 0.168 6.270533e-228
## Ar          3.542646e-232 -1.1059135 0.106 0.292 9.918700e-228
## Prkcdbp     5.393923e-231  0.5667658 0.664 0.447 1.510190e-226
## Arpc3       1.058140e-230  0.5876717 0.634 0.409 2.962581e-226
## Sept4       8.375766e-229 -0.8256593 0.254 0.459 2.345047e-224
## Plec        1.202547e-227  0.8098116 0.321 0.139 3.366892e-223
## Rab11a      8.876388e-227  0.6948087 0.486 0.272 2.485211e-222
## Ak3         9.636219e-227 -0.9686244 0.179 0.370 2.697949e-222
## Tgfbr2      1.198640e-226  0.8382196 0.303 0.127 3.355953e-222
## Gm9493      1.221461e-221  0.6157313 0.583 0.358 3.419848e-217
## Rps27rt     3.848293e-219  0.5697616 0.662 0.441 1.077445e-214
## Atp1b3      4.102958e-219  0.7375508 0.346 0.156 1.148746e-214
## Plod1       8.495871e-217  0.7635292 0.268 0.104 2.378674e-212
## Il6st       1.141690e-216  0.7860238 0.492 0.301 3.196505e-212
## Pcolce      1.223606e-216 -0.6346412 0.373 0.604 3.425853e-212
## Rpl15       5.600647e-215  0.5445678 0.670 0.454 1.568069e-210
## Uqcrh       7.154029e-214  0.3923757 0.841 0.680 2.002985e-209
## Pde2a       8.536154e-213  0.8869319 0.277 0.116 2.389952e-208
## Clic1       1.543354e-212  0.5546089 0.642 0.437 4.321083e-208
## Btg2        4.958370e-212 -0.4238987 0.713 0.792 1.388244e-207
## Cdh2        5.799636e-212 -1.0413587 0.087 0.261 1.623782e-207
## Gnai2       2.553808e-210  0.3781554 0.826 0.683 7.150152e-206
## Tuba1a      1.151002e-205 -0.4792080 0.576 0.712 3.222575e-201
## Ltbp1       2.951851e-205 -1.0125531 0.099 0.271 8.264593e-201
## Islr        9.667721e-204 -0.8164970 0.231 0.421 2.706769e-199
```

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## Efemp2        6.932272e-203 -0.8126148 0.243 0.423 1.940897e-198
## Bmp4          1.818310e-200 -1.0502677 0.102 0.273 5.090904e-196
## Lgals3        6.953001e-200  0.8199643 0.356 0.178 1.946701e-195
## Rftn1         3.619377e-199 -0.9884088 0.103 0.273 1.013353e-194
## Tinagl1       6.943641e-199  0.7356141 0.284 0.116 1.944080e-194
## Rpl23a-ps3    9.289498e-199  0.4706202 0.747 0.544 2.600874e-194
## Zfp36l2       7.103919e-197 -0.6116468 0.463 0.603 1.988955e-192
## Igf1          2.273012e-196 -0.9528115 0.101 0.275 6.363980e-192
## Pten          6.182501e-196 -0.8896852 0.212 0.385 1.730977e-191
## Gadd45b       2.552605e-195 -0.6450543 0.390 0.569 7.146784e-191
## Ybx1          8.350443e-195  0.3256027 0.869 0.741 2.337957e-190
## Cmip          1.832523e-194  0.7592961 0.300 0.135 5.130699e-190
## Rpl35         6.424567e-194  0.4230880 0.790 0.613 1.798750e-189
## Rgcc          9.948362e-194 -0.4990419 0.524 0.695 2.785342e-189
## Bambi         3.548714e-193  0.7546735 0.343 0.167 9.935688e-189
## Ifnar2        3.079332e-192 -0.7172814 0.329 0.489 8.621514e-188
## Irf1          8.831702e-192 -0.7187763 0.348 0.511 2.472700e-187
## Pfdn5         1.587823e-191  0.3238501 0.875 0.746 4.445588e-187
## Carhsp1       5.813741e-190  0.7051450 0.313 0.144 1.627731e-185
## Vamp5         6.341494e-190  0.7547115 0.379 0.205 1.775492e-185
## Pdgfra        1.191472e-186 -0.8767827 0.174 0.350 3.335884e-182
## St3gal6       4.497690e-186 -0.8349859 0.220 0.393 1.259263e-181
## Ctsb          1.178210e-185  0.3675347 0.807 0.676 3.298753e-181
## Rpl6l         7.284264e-185  0.4847400 0.679 0.479 2.039448e-180
## Arl6ip5       4.157206e-184  0.5960441 0.517 0.310 1.163934e-179
## Txnip         4.368689e-184  0.5360980 0.640 0.437 1.223145e-179
## S100a10       9.377551e-183  0.5000433 0.696 0.515 2.625527e-178
## Nbl1          1.187754e-182  0.8560473 0.342 0.178 3.325473e-178
## Ibsp          1.480382e-182 -0.6609067 0.212 0.434 4.144775e-178
## Six1          1.603705e-182 -0.9163755 0.147 0.318 4.490053e-178
## Gm15013       2.342495e-182  0.6074846 0.495 0.292 6.558517e-178
## Npc2          2.638796e-182 -0.3712218 0.660 0.739 7.388100e-178
## Scp2          4.887662e-182 -0.5403143 0.493 0.610 1.368448e-177
## Ogt           2.436530e-180 -0.6882376 0.357 0.510 6.821798e-176
## Ier5          1.029563e-179 -0.5275989 0.566 0.662 2.882571e-175
## Rpl10-ps3     1.828031e-179  0.3600610 0.818 0.676 5.118121e-175
## Sh3bp5        2.333056e-176  0.7859899 0.312 0.156 6.532091e-172
## Gja1          3.093771e-176 -0.6424939 0.365 0.531 8.661940e-172
## Serpinh1      9.826201e-176 -0.3559578 0.692 0.797 2.751140e-171
## Wdr89         2.315102e-174  0.5065438 0.636 0.434 6.481823e-170
## Glud1         1.006093e-173  0.6435991 0.387 0.207 2.816859e-169
## Nr2f2         1.650601e-173  0.7814457 0.263 0.117 4.621354e-169
## Clta          3.128509e-173  0.4340400 0.731 0.550 8.759201e-169
## Jup           3.644680e-173  0.7115416 0.298 0.140 1.020437e-168
## Marcks        2.472821e-172 -0.4679110 0.527 0.671 6.923404e-168
## Apbb2         6.029604e-172 -0.7374517 0.266 0.435 1.688168e-167
## Cfh           3.991931e-171 -0.6217037 0.232 0.444 1.117661e-166
## Heg1          2.282115e-167  0.7454962 0.297 0.144 6.389467e-163
## Slc43a3       4.184658e-167  0.6992443 0.287 0.134 1.171620e-162
## Thbs1         6.070846e-167 -0.8631724 0.155 0.321 1.699716e-162
## Tcn2          1.882441e-166  0.7040178 0.401 0.238 5.270460e-162
## Clic4         1.886198e-166  0.5696035 0.523 0.329 5.280976e-162
## S100a16       6.871344e-166  0.4838015 0.658 0.474 1.923839e-161
## Dlc1          1.092121e-164 -0.6589995 0.351 0.503 3.057722e-160
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## Gm10263      1.283874e-164   0.6589530 0.314 0.153 3.594591e-160
## Tpm3         1.865564e-163   0.5163988 0.576 0.377 5.223206e-159
## Anxa1        2.677474e-163  -0.5218008 0.481 0.634 7.496391e-159
## Pdlim2       4.487864e-163  -0.7730893 0.211 0.374 1.256512e-158
## Ccdc85b      8.286581e-163   0.6526778 0.383 0.214 2.320077e-158
## Adam15       1.068049e-162   0.7055724 0.348 0.187 2.990324e-158
## Rpl9-ps6     1.176904e-162   0.4800734 0.644 0.452 3.295095e-158
## Mylip        8.952998e-161   0.7463837 0.268 0.125 2.506660e-156
## Cnn3         5.508860e-160   0.5692452 0.487 0.301 1.542371e-155
## Gm11808      2.678076e-158   0.5562476 0.472 0.282 7.498077e-154
## Antxr1       5.942822e-158  -0.8052845 0.168 0.327 1.663871e-153
## Eif3h        3.398008e-157   0.4243250 0.712 0.527 9.513744e-153
## Pim1         7.268526e-154  -0.7278879 0.297 0.451 2.035042e-149
## Ecm1         1.181930e-153  -0.5932135 0.311 0.493 3.309168e-149
## Insig2       3.530409e-151  -0.6575906 0.305 0.456 9.884440e-147
## Rpl6         5.583607e-151   0.3719997 0.783 0.623 1.563298e-146
## Cald1        1.711230e-150  -0.4681511 0.515 0.644 4.791103e-146
## Oat          1.952672e-150  -0.6712746 0.290 0.441 5.467090e-146
## Gm12216      6.649082e-149  -0.8180312 0.187 0.341 1.861610e-144
## Emp2         8.840864e-149  -0.7405673 0.210 0.364 2.475265e-144
## Lgals3bp     1.100774e-148  -0.8646810 0.138 0.280 3.081946e-144
## Ctsd         1.847907e-146   0.4612338 0.637 0.451 5.173770e-142
## Fat1         2.752919e-146  -0.8537709 0.126 0.269 7.707621e-142
## Pea15a       5.322744e-146   0.6394097 0.293 0.146 1.490262e-141
## Tgm2         5.716405e-146   0.5936864 0.427 0.260 1.600479e-141
## Chst2        1.053904e-145   0.7349425 0.255 0.123 2.950721e-141
## Gm10036      1.755484e-145   0.5124222 0.523 0.337 4.915005e-141
## Fxyd1        5.236878e-145  -0.4881532 0.403 0.588 1.466221e-140
## Rgs3         2.850951e-144  -0.6501901 0.351 0.493 7.982094e-140
## Prrx1        1.284059e-143  -0.7136612 0.204 0.364 3.595108e-139
## Pgrmc1       5.366561e-143  -0.5181274 0.443 0.568 1.502530e-138
## Tmem159      6.719696e-143  -0.7580169 0.210 0.355 1.881380e-138
## Phlda1       1.515355e-142  -0.6324832 0.389 0.528 4.242690e-138
## Ctnnb1       3.313872e-141   0.5053374 0.536 0.354 9.278178e-137
## Ece1         2.013263e-140   0.6344734 0.335 0.183 5.636735e-136
## P2rx4        6.952743e-140  -0.8486731 0.146 0.284 1.946629e-135
## Hspa5        1.665424e-139  -0.3977398 0.598 0.687 4.662853e-135
## Rpl13-ps3    2.128169e-139   0.4658130 0.597 0.411 5.958448e-135
## Thra         1.511080e-138  -0.5948437 0.333 0.478 4.230722e-134
## Rhob         8.052637e-138  -0.4186429 0.581 0.684 2.254577e-133
## Pnrc1        3.256299e-137  -0.3199362 0.700 0.779 9.116986e-133
## Cav1         6.963803e-137   0.5118586 0.301 0.148 1.949725e-132
## Jak1         1.469510e-135   0.5809914 0.459 0.295 4.114335e-131
## Klf4         3.988238e-135   0.3758663 0.779 0.594 1.116627e-130
## Anxa3        4.520664e-134   0.5716033 0.333 0.181 1.265695e-129
## Rsrp1        1.986650e-133  -0.3115264 0.706 0.775 5.562222e-129
## Rpl7a        1.059047e-132   0.3610812 0.763 0.603 2.965121e-128
## Csrp2        1.765922e-132   0.6174440 0.276 0.140 4.944228e-128
## Nsa2         1.796369e-132   0.5681394 0.323 0.173 5.029474e-128
## Ppp2r5a      1.097880e-131   0.6032286 0.263 0.129 3.073844e-127
## Aebp1        1.423942e-131   0.6006671 0.371 0.217 3.986753e-127
## Olfml3       4.757761e-131  -0.5419443 0.257 0.443 1.332078e-126
## Klf2         9.698947e-131  -0.2624610 0.823 0.841 2.715511e-126
## Sdcbp        1.136790e-130   0.4719713 0.546 0.367 3.182784e-126
```

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## Epas1            4.170516e-130 -0.4840387 0.404 0.555 1.167661e-125
## Mgat4b           2.038483e-129  0.6135225 0.267 0.136 5.707345e-125
## Rps26-ps1        2.150151e-129  0.5255684 0.411 0.246 6.019994e-125
## Srsf5            2.644231e-128 -0.3227216 0.692 0.755 7.403318e-124
## Arhgap31         1.518721e-127  0.5281888 0.484 0.323 4.252116e-123
## Dpysl3           2.233772e-127 -0.6232443 0.239 0.390 6.254115e-123
## Runx2            2.286590e-127 -0.7615150 0.144 0.281 6.401995e-123
## Cxcl1            5.007262e-127 -0.9716401 0.120 0.250 1.401933e-122
## Comp             2.765590e-126  0.7948215 0.273 0.147 7.743100e-122
## Crip2            1.692093e-125  0.4080863 0.683 0.512 4.737521e-121
## Gltscr2          3.642289e-125  0.4400824 0.583 0.403 1.019768e-120
## Cmpk1            4.671842e-125  0.4901419 0.414 0.246 1.308022e-120
## Sod1             2.341236e-124  0.5158271 0.415 0.253 6.554992e-120
## Son              2.846067e-124 -0.2779669 0.733 0.789 7.968419e-120
## Nol7             4.391838e-123  0.5146526 0.401 0.239 1.229627e-118
## Gngt2            1.009383e-122  0.5974393 0.291 0.157 2.826070e-118
## Use1             1.154172e-122  0.4482801 0.564 0.383 3.231452e-118
## Phlda3           2.138825e-122 -0.5558957 0.313 0.460 5.988283e-118
## Tob1             1.739760e-121  0.4844873 0.502 0.332 4.870979e-117
## Bag1             2.561775e-121  0.4710969 0.486 0.314 7.172457e-117
## 1700025G04Rik    1.179681e-120  0.5698132 0.301 0.164 3.302870e-116
## Rpl27-ps3        1.346200e-120  0.5026222 0.426 0.263 3.769090e-116
## Rab34            1.987085e-120 -0.6787384 0.222 0.355 5.563440e-116
## Gm10020          7.388092e-120  0.5455955 0.268 0.136 2.068518e-115
## Prnp             7.874795e-120  0.5899282 0.310 0.173 2.204785e-115
## Fndc3b           1.317306e-119 -0.6780885 0.264 0.387 3.688194e-115
## Id2              1.501323e-119  0.4749976 0.472 0.302 4.203403e-115
## Calm1            5.040380e-119  0.2731276 0.828 0.727 1.411206e-114
## Ralb             2.050318e-118  0.5590982 0.322 0.182 5.740481e-114
## Pik3r1           2.250693e-118 -0.5764346 0.349 0.471 6.301489e-114
## Slc9a3r2         9.703153e-118  0.6266732 0.346 0.209 2.716689e-113
## Lbp              1.518497e-117 -0.6603841 0.238 0.374 4.251488e-113
## Vmp1             5.683158e-117 -0.7375362 0.212 0.337 1.591171e-112
## Guk1             2.572624e-116  0.5014312 0.314 0.172 7.202832e-112
## Tpst2            7.867582e-116  0.5371872 0.325 0.184 2.202766e-111
## S100a1           2.597754e-115  0.5107117 0.379 0.227 7.273193e-111
## Serinc3          6.082395e-115  0.4402045 0.562 0.397 1.702949e-110
## Pitpna           7.910753e-115  0.4997410 0.356 0.208 2.214853e-110
## Eif3e            1.571823e-114  0.3967204 0.631 0.462 4.400789e-110
## Adamts5          2.706780e-112  0.6067176 0.405 0.274 7.578443e-108
## Vat1             1.207337e-111  0.4968544 0.344 0.199 3.380303e-107
## Map1lc3a         2.555393e-111 -0.3997228 0.509 0.614 7.154589e-107
## Pnisr            2.721745e-111 -0.5771693 0.341 0.457 7.620341e-107
## Mapk3            8.741912e-111  0.4984405 0.407 0.255 2.447560e-106
## Gapdh            9.198429e-111  0.3217302 0.738 0.596 2.575376e-106
## Cox7c            4.100399e-110  0.2743711 0.830 0.710 1.148030e-105
## Higd2a           2.734236e-109  0.4472851 0.490 0.325 7.655314e-105
## Snx3             8.535247e-109  0.4021308 0.589 0.417 2.389698e-104
## Sash1            9.119905e-109  0.5279484 0.317 0.183 2.553391e-104
## Rap1a            1.054314e-108  0.4116128 0.550 0.377 2.951869e-104
## Camk2n1          1.570959e-108 -0.5438175 0.341 0.465 4.398370e-104
## Atp13a3          4.188350e-108 -0.6964847 0.141 0.265 1.172654e-103
## Rps18-ps3        5.458085e-107  0.4717323 0.344 0.201 1.528155e-102
## Slc29a1          1.582016e-106 -0.4077103 0.510 0.600 4.429329e-102
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## Anxa6          2.256510e-105 -0.6742820 0.193 0.314 6.317776e-101
## Asph           5.566990e-105 -0.7013097 0.178 0.298 1.558646e-100
## Gnb1           1.154667e-104  0.3853224 0.618 0.456 3.232835e-100
## Tuba1c         1.917887e-104 -0.7281879 0.151 0.269 5.369700e-100
## Dusp1          1.063219e-103 -0.2649553 0.758 0.792 2.976801e-99
## Cul1           4.423698e-103 -0.6502109 0.235 0.354 1.238547e-98
## Rhoj           4.982952e-103  0.4654760 0.400 0.254 1.395127e-98
## Fam3c          5.139887e-103  0.5281774 0.290 0.163 1.439066e-98
## Tspan17        2.110371e-102 -0.6597526 0.212 0.330 5.908617e-98
## Arl4a          2.931983e-102  0.4881720 0.344 0.206 8.208965e-98
## Itih5          4.132038e-102 -0.6719863 0.156 0.280 1.156888e-97
## Dnajb1         5.661231e-102 -0.6332147 0.368 0.465 1.585031e-97
## Tcf7l2         6.883363e-102 -0.6550149 0.206 0.328 1.927204e-97
## Dusp3          1.442654e-101  0.5633240 0.259 0.141 4.039142e-97
## Anp32a         3.274903e-101  0.4455213 0.477 0.324 9.169074e-97
## Gns            1.177157e-100 -0.7064684 0.177 0.291 3.295803e-96
## Cltb           1.678634e-100  0.4375917 0.451 0.297 4.699839e-96
## Bnip2           1.401080e-99  0.4896791 0.312 0.181 3.922744e-95
## Dapk2           2.384269e-99  0.5679349 0.302 0.180 6.675478e-95
## Mgst1           1.600581e-98 -0.4082811 0.424 0.565 4.481306e-94
## H2-T22          3.364341e-97 -0.5162529 0.339 0.448 9.419481e-93
## Nisch           6.710516e-97 -0.4509616 0.432 0.529 1.878810e-92
## H2-Q4           1.135365e-96 -0.5709342 0.239 0.365 3.178794e-92
## Rab5c           1.726977e-96  0.4332533 0.448 0.304 4.835190e-92
## Ier2            8.923664e-96 -0.2841527 0.723 0.749 2.498447e-91
## Lrp1            9.247461e-96 -0.4873827 0.328 0.462 2.589104e-91
## Raph1           2.194960e-95  0.4533259 0.298 0.170 6.145450e-91
## Atp5g2          4.730946e-95  0.2900431 0.750 0.619 1.324570e-90
## 2700094K13Rik   6.308431e-95  0.4935384 0.274 0.155 1.766234e-90
## Cltc            1.015429e-94  0.4692711 0.382 0.245 2.842997e-90
## Ifngr2          2.150944e-94 -0.6032975 0.241 0.355 6.022212e-90
## Lamc1           2.881258e-92 -0.6338422 0.178 0.293 8.066947e-88
## Sypl            3.678123e-92  0.4337073 0.403 0.261 1.029801e-87
## Dynlt3          4.243903e-92  0.4358368 0.303 0.175 1.188208e-87
## Tgfbr3          2.824069e-91 -0.5293129 0.301 0.414 7.906827e-87
## Tsc22d3         3.783145e-91 -0.3777385 0.489 0.604 1.059205e-86
## Hn1             1.044968e-90  0.4600306 0.370 0.237 2.925701e-86
## Wwtr1           9.692436e-90  0.4657689 0.270 0.153 2.713688e-85
## Sod2            1.650041e-89 -0.5763354 0.280 0.381 4.619786e-85
## Vasn            5.433364e-89 -0.6545238 0.192 0.301 1.521233e-84
## Cd164           1.228949e-88  0.4377957 0.355 0.222 3.440812e-84
## Minos1          1.585363e-88  0.3401033 0.646 0.497 4.438699e-84
## Sgk1            6.483229e-88  0.4092511 0.496 0.353 1.815175e-83
## Eif3f           2.557122e-87  0.2639738 0.790 0.671 7.159430e-83
## Gsn             7.863466e-87  0.5509295 0.491 0.381 2.201613e-82
## H1f0            7.895563e-87  0.4537399 0.363 0.232 2.210600e-82
## Uqcc2           1.673395e-86  0.3915334 0.513 0.369 4.685170e-82
## Hmgn3           9.659206e-86 -0.4799694 0.358 0.458 2.704385e-81
## Slc38a2         1.365774e-85 -0.3467439 0.593 0.640 3.823895e-81
## Pls3            1.463228e-85  0.4558162 0.297 0.176 4.096746e-81
## Rnf130          2.988839e-83  0.4308704 0.368 0.239 8.368150e-79
## Dynll2          1.254204e-82  0.4440571 0.278 0.163 3.511520e-78
## Hprt            1.490911e-82  0.4329875 0.296 0.177 4.174252e-78
## Cstb            1.703020e-82 -0.3815419 0.483 0.554 4.768117e-78
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## Sgce             2.270634e-82 -0.6212085 0.158 0.263  6.357320e-78
## Hmg20b           5.819250e-82  0.4322914 0.314 0.192  1.629273e-77
## Ptgis            9.791252e-82  0.5881490 0.252 0.149  2.741355e-77
## Chmp2b           2.599519e-81  0.4325437 0.263 0.152  7.278134e-77
## Pmp22            5.966016e-81 -0.3902702 0.419 0.535  1.670365e-76
## Wbp5             9.388457e-81  0.3623221 0.530 0.387  2.628580e-76
## Rbpms            9.220645e-80 -0.5237241 0.230 0.343  2.581596e-75
## Mmp2             1.198327e-79  0.6173565 0.261 0.162  3.355077e-75
## Gtpbp2           2.234983e-79 -0.5830579 0.238 0.339  6.257505e-75
## Ptms             2.531956e-79  0.3083805 0.685 0.538  7.088971e-75
## Nsg1             1.604729e-78 -0.5865534 0.170 0.276  4.492921e-74
## Tnfsf12          4.458152e-78 -0.5374776 0.239 0.343  1.248193e-73
## Ctnna1           5.092967e-78  0.4237115 0.302 0.185  1.425929e-73
## Rab9             6.727544e-78 -0.6058668 0.201 0.299  1.883578e-73
## Akap13           1.322709e-77  0.4365834 0.308 0.191  3.703321e-73
## Uqcc3            8.053533e-77  0.3910425 0.409 0.275  2.254828e-72
## Ndufc2           2.334370e-76  0.3419694 0.586 0.449  6.535769e-72
## Map4k4           7.939407e-76 -0.4643417 0.364 0.459  2.222875e-71
## Srpx2            1.681142e-75 -0.5530061 0.151 0.256  4.706862e-71
## Cox7a2           5.427433e-75  0.2570640 0.778 0.652  1.519573e-70
## Cbfb             5.393389e-74  0.3857785 0.269 0.159  1.510041e-69
## Sumo3            7.720964e-74  0.3571030 0.505 0.366  2.161715e-69
## Ogn              1.341571e-72 -0.4216149 0.185 0.304  3.756130e-68
## Il10rb           2.782279e-72 -0.5281236 0.218 0.319  7.789824e-68
## Rai14            3.926332e-72 -0.6183588 0.160 0.255  1.099294e-67
## Anxa7            4.308962e-72  0.3883356 0.351 0.228  1.206423e-67
## Ccdc80           5.896708e-72  0.4115091 0.289 0.179  1.650960e-67
## Mrpl52           7.799266e-72  0.3070206 0.664 0.527  2.183639e-67
## Clk4             1.018948e-71 -0.5909194 0.187 0.282  2.852851e-67
## Amotl1           1.063727e-71  0.3895342 0.330 0.212  2.978223e-67
## Snx2             1.580223e-71  0.4235627 0.274 0.168  4.424309e-67
## Txndc17          1.683698e-71  0.3192675 0.574 0.430  4.714017e-67
## 2010111I01Rik    1.912606e-71  0.3908000 0.334 0.215  5.354913e-67
## Hras             2.938609e-71  0.3890238 0.296 0.183  8.227517e-67
## Emp1             8.228027e-71 -0.2789707 0.596 0.670  2.303683e-66
## Xiap             3.190713e-70  0.4338369 0.261 0.159  8.933357e-66
## Plin2            3.747782e-70  0.4436480 0.256 0.156  1.049304e-65
## Anxa2            5.793777e-70  0.3138758 0.633 0.510  1.622142e-65
## Fus              3.183919e-69 -0.2714768 0.627 0.677  8.914336e-65
## Tbca             5.742589e-69  0.3000496 0.639 0.491  1.607810e-64
## Ctsl             7.766896e-69  0.2902080 0.734 0.667  2.174576e-64
## Ift43            8.361937e-69 -0.5658874 0.179 0.272  2.341175e-64
## Snrk             1.569676e-68  0.4289796 0.335 0.224  4.394780e-64
## Hspa1a           3.009815e-68  0.3895457 0.349 0.231  8.426880e-64
## Higd1a           1.511735e-67  0.3517398 0.411 0.284  4.232556e-63
## Ppp3ca           1.612526e-67  0.3300733 0.472 0.335  4.514751e-63
## Dazap2           3.534414e-67  0.3522212 0.427 0.299  9.895651e-63
## Cd200            4.354352e-67  0.3719408 0.484 0.369  1.219132e-62
## Eif2s2           4.387809e-67  0.3339883 0.468 0.331  1.228499e-62
## Iigp1            7.090612e-67 -0.6412900 0.179 0.274  1.985229e-62
## Ppp1r14b         2.205440e-66  0.4164144 0.315 0.207  6.174791e-62
## Dstn             2.908483e-66  0.2572962 0.726 0.595  8.143170e-62
## Pdia6            5.211764e-66 -0.3805237 0.417 0.489  1.459190e-61
## Comt             2.623814e-65 -0.2935467 0.545 0.603  7.346155e-61
```

```
## Gadd45g          1.176462e-64 -0.3687627 0.530 0.590  3.293859e-60
## Syngr2           3.696216e-64  0.3991873 0.253 0.156  1.034866e-59
## Naa38            5.020456e-64  0.3507426 0.351 0.233  1.405627e-59
## Zfos1            5.462272e-64  0.2958856 0.593 0.454  1.529327e-59
## Prg4             7.519199e-64  0.7521487 0.261 0.175  2.105225e-59
## Sdc2             1.070527e-63 -0.3931585 0.290 0.405  2.997261e-59
## Synpo            1.248814e-63 -0.5633412 0.188 0.277  3.496429e-59
## 2210013O21Rik    1.470925e-62  0.3523222 0.344 0.230  4.118296e-58
## Gabarapl2        2.393827e-62  0.2963516 0.592 0.449  6.702238e-58
## Kras             6.540332e-62  0.3854837 0.255 0.158  1.831162e-57
## Psenen           2.832018e-61  0.2998662 0.546 0.406  7.929083e-57
## Adipor1          4.968690e-61  0.3073492 0.491 0.357  1.391134e-56
## Ppic             7.680130e-61  0.3149379 0.526 0.407  2.150283e-56
## Purb             8.219642e-61  0.3768961 0.278 0.178  2.301335e-56
## Adamts1          2.803446e-60 -0.4224246 0.366 0.456  7.849089e-56
## Scn1b            5.169775e-60  0.3316756 0.422 0.298  1.447434e-55
## Osbpl9           8.941968e-60  0.3417000 0.300 0.193  2.503572e-55
## Arl2bp           1.474860e-59  0.3637972 0.291 0.188  4.129312e-55
## Dnaja1           2.593165e-59 -0.3041756 0.591 0.624  7.260344e-55
## Ost4             4.905257e-59  0.2595157 0.679 0.562  1.373374e-54
## Atp6v1f          8.552705e-59  0.2970229 0.567 0.432  2.394586e-54
## Timm10b          8.721887e-59  0.3338875 0.388 0.270  2.441954e-54
## Eif4ebp1         9.644139e-59 -0.4169892 0.339 0.417  2.700166e-54
## Sdc4             2.278409e-58 -0.3146236 0.410 0.531  6.379090e-54
## Ppp1r2           3.868605e-58  0.2752448 0.601 0.470  1.083132e-53
## S1pr1            1.054507e-57  0.4183356 0.271 0.177  2.952408e-53
## Mrpl17           5.916100e-57  0.3276731 0.367 0.254  1.656390e-52
## Cct2             1.322630e-56  0.3168003 0.342 0.230  3.703101e-52
## Abhd17a          1.700912e-56  0.3434662 0.323 0.217  4.762213e-52
## Hcfc1r1          3.241302e-56  0.3048521 0.455 0.328  9.074996e-52
## Actn4            3.287244e-56  0.3204263 0.465 0.344  9.203625e-52
## Pon2             4.601819e-56 -0.4333433 0.310 0.388  1.288417e-51
## Ctsz             1.833935e-55 -0.3111200 0.461 0.529  5.134650e-51
## Kmt2e            1.973199e-55 -0.3487068 0.436 0.503  5.524562e-51
## Uhrf2            3.013045e-55 -0.4865980 0.274 0.355  8.435923e-51
## Fkbp3            4.192548e-55  0.3387087 0.301 0.199  1.173830e-50
## Anxa5            1.309008e-54  0.2792793 0.620 0.513  3.664961e-50
## Vamp3            2.047173e-54  0.3178264 0.283 0.184  5.731675e-50
## Pink1            2.262261e-54  0.3126705 0.356 0.244  6.333880e-50
## 2700060E02Rik    1.926458e-53  0.2643997 0.619 0.493  5.393698e-49
## Card19           1.929022e-53  0.3266210 0.368 0.258  5.400876e-49
## Baiap2           6.411682e-53 -0.5340672 0.202 0.281  1.795143e-48
## Ppp1cc           6.681092e-53  0.2949695 0.505 0.380  1.870572e-48
## Pak2             9.769535e-53  0.3392275 0.273 0.179  2.735274e-48
## Tmbim1           1.466514e-52  0.3220015 0.357 0.251  4.105945e-48
## Ppp1r11          7.719437e-52  0.3286677 0.332 0.229  2.161288e-47
## Auts2            2.340196e-51 -0.4566205 0.244 0.326  6.552081e-47
## Klf10            2.357616e-51  0.3193651 0.287 0.189  6.600853e-47
## Ifngr1           3.803293e-51 -0.3211564 0.430 0.503  1.064846e-46
## Ckap4            5.418526e-51 -0.4083371 0.299 0.376  1.517079e-46
## Brk1             6.207983e-51  0.2657144 0.590 0.460  1.738111e-46
## Pfdn1            6.397149e-51  0.3046078 0.375 0.263  1.791074e-46
## Csrnp1           7.868011e-51  0.3663408 0.251 0.164  2.202886e-46
## Nktr             1.202740e-49 -0.4338400 0.306 0.378  3.367431e-45
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## Csrp1          3.558509e-49  0.2604643 0.366 0.256  9.963112e-45
## Rnaseh2c        6.091552e-49  0.3136383 0.262 0.171  1.705513e-44
## Wnk1            8.077926e-49  0.2902469 0.382 0.270  2.261658e-44
## Plxnd1          8.125260e-49  0.3876852 0.266 0.182  2.274910e-44
## Cdc37           4.546813e-48  0.2916045 0.406 0.294  1.273017e-43
## Lsm2            4.640838e-48  0.3217765 0.256 0.168  1.299342e-43
## Tra2b           7.828231e-48 -0.2713600 0.562 0.597  2.191748e-43
## 2410015M20Rik   1.363691e-47  0.2809725 0.500 0.377  3.818062e-43
## Gabarapl1       2.726945e-47  0.3187180 0.324 0.227  7.634901e-43
## Leprot          4.034553e-47  0.2799709 0.420 0.307  1.129594e-42
## Snhg6           4.836468e-47  0.3009946 0.261 0.171  1.354114e-42
## Gem             2.072547e-46  0.3326336 0.259 0.172  5.802716e-42
## Fgfr1           2.142887e-46 -0.3456305 0.318 0.403  5.999655e-42
## Bzw1            2.458897e-46  0.2901758 0.346 0.243  6.884420e-42
## Chmp4b          3.223194e-46  0.2614924 0.519 0.396  9.024300e-42
## Prelid1         5.778310e-46  0.2707651 0.495 0.382  1.617811e-41
## Rbm17           9.654297e-46  0.2973756 0.272 0.182  2.703010e-41
## Abi3bp          1.039363e-45 -0.3597935 0.210 0.303  2.910008e-41
## Bscl2           1.184607e-45 -0.5002984 0.185 0.254  3.316661e-41
## Hif1a           4.149219e-45  0.3301669 0.330 0.236  1.161698e-40
## Cited2          4.251754e-45 -0.4035141 0.340 0.409  1.190406e-40
## Pgam1           1.468713e-44  0.2762455 0.402 0.297  4.112103e-40
## Lzts2           2.434520e-44 -0.4070828 0.244 0.318  6.816170e-40
## Ptbp3           2.672289e-44  0.2811215 0.467 0.361  7.481875e-40
## Man1a           3.461907e-44  0.3389665 0.312 0.223  9.692648e-40
## Sptbn1          7.415165e-44  0.2565028 0.549 0.438  2.076098e-39
## Stard3nl        8.531026e-44 -0.4389728 0.226 0.297  2.388517e-39
## Ndufc1          1.351147e-43  0.2592599 0.486 0.367  3.782943e-39
## Dtnbp1          1.397546e-43 -0.4467310 0.233 0.302  3.912848e-39
## Prelp           4.665787e-43 -0.2839358 0.307 0.413  1.306327e-38
## Qk              4.937821e-43  0.2680584 0.374 0.270  1.382491e-38
## Spag9           5.102280e-43  0.3005819 0.365 0.266  1.428536e-38
## Pdlim4          7.261929e-43 -0.3653386 0.228 0.311  2.033195e-38
## Dhrs3           1.505735e-42 -0.3747930 0.288 0.363  4.215756e-38
## Colec12         1.834112e-42 -0.3510322 0.310 0.389  5.135146e-38
## Brd2            1.985822e-42 -0.2981456 0.504 0.541  5.559904e-38
## Gm26532         3.368154e-42 -0.3660728 0.412 0.467  9.430156e-38
## Lsm6            7.320164e-42  0.2786847 0.344 0.246  2.049500e-37
## Txn2            8.138736e-42  0.2630012 0.382 0.277  2.278683e-37
## Smim10l1        8.963021e-42  0.2554517 0.403 0.296  2.509466e-37
## Cd82            1.106814e-41  0.2798279 0.262 0.176  3.098857e-37
## Ube2l3          1.528611e-41  0.2622381 0.374 0.271  4.279806e-37
## Emg1            2.153654e-41  0.2719178 0.369 0.268  6.029801e-37
## Camk2d          6.289000e-41 -0.3905425 0.269 0.339  1.760794e-36
## Nfkbiz          1.831154e-40 -0.3663875 0.348 0.409  5.126865e-36
## Supt4a          5.277574e-40  0.2553229 0.381 0.278  1.477615e-35
## Clk1            8.231559e-40 -0.2953826 0.462 0.507  2.304672e-35
## Pabpn1          1.644207e-39 -0.4718091 0.192 0.257  4.603450e-35
## Foxp1           1.986508e-39 -0.2794830 0.443 0.503  5.561825e-35
## Rcn1            4.234710e-39 -0.4158570 0.224 0.291  1.185634e-34
## Bcl2            5.152788e-38 -0.4038674 0.187 0.257  1.442678e-33
## Stx12           1.388982e-37  0.2661362 0.266 0.184  3.888873e-33
## Lifr            2.394180e-37 -0.2886614 0.259 0.344  6.703226e-33
## Hes1            5.673262e-37 -0.3055264 0.455 0.506  1.588400e-32
```

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## Dag1             5.997401e-37 -0.4084897 0.218 0.282  1.679152e-32
## Nfe2l1           1.274343e-36  0.2604801 0.278 0.195  3.567906e-32
## Sdf2l1           1.326479e-36 -0.4373642 0.190 0.252  3.713875e-32
## Med13l           1.375687e-36 -0.4132836 0.210 0.275  3.851649e-32
## Nr4a1            2.427613e-36 -0.3177048 0.427 0.477  6.796831e-32
## Prdx4            8.585334e-36 -0.2950883 0.397 0.452  2.403722e-31
## Arl6ip1          1.432803e-35  0.2593839 0.433 0.338  4.011561e-31
## Sertad1          4.949255e-35 -0.2875818 0.433 0.482  1.385693e-30
## Bst2             2.015694e-34  0.2688319 0.476 0.396  5.643541e-30
## Htra1            8.330475e-34  0.2994538 0.306 0.232  2.332366e-29
## Iah1             1.992181e-33 -0.4126974 0.196 0.256  5.577707e-29
## Txndc5           2.483331e-33 -0.3357967 0.273 0.336  6.952830e-29
## 4930523C07Rik    2.804443e-33  0.2536261 0.303 0.221  7.851880e-29
## Xbp1             3.344807e-33  0.2548893 0.492 0.401  9.364791e-29
## Ugcg             5.411438e-33  0.3416042 0.264 0.195  1.515094e-28
## Phip             9.364522e-33 -0.3953103 0.250 0.309  2.621879e-28
## Dnajc3           1.885261e-32 -0.2905616 0.398 0.444  5.278354e-28
## Rpn2             2.882699e-32 -0.2899960 0.395 0.440  8.070980e-28
## H2-Q6            3.227423e-32 -0.3386630 0.205 0.272  9.036138e-28
## Cib1             1.247742e-31 -0.4077816 0.204 0.259  3.493427e-27
## Rras             1.444874e-31 -0.3556003 0.270 0.326  4.045357e-27
## Clec2d           2.084187e-31 -0.3441564 0.246 0.312  5.835308e-27
## Ssbp2            6.285611e-31 -0.3984505 0.191 0.250  1.759845e-26
## Col3a1           8.996994e-31  0.5501088 0.250 0.200  2.518978e-26
## Atxn7l3b         9.254413e-31 -0.2636092 0.442 0.480  2.591051e-26
## Cpq              2.184319e-30 -0.3591840 0.219 0.278  6.115656e-26
## Flna             6.276439e-30 -0.3798649 0.245 0.298  1.757277e-25
## Igfbp3           1.627946e-29 -0.3686012 0.188 0.255  4.557923e-25
## Pmepa1           2.227794e-29 -0.3333701 0.227 0.289  6.237377e-25
## Limch1           1.687341e-28 -0.3264669 0.216 0.278  4.724217e-24
## Slc50a1          1.696571e-28 -0.2670482 0.386 0.436  4.750059e-24
## March5           5.506059e-28 -0.3371564 0.297 0.344  1.541586e-23
## Ankrd12          2.535593e-27 -0.3491744 0.269 0.319  7.099152e-23
## Ndufs4           4.714499e-27 -0.3241928 0.311 0.354  1.319965e-22
## Trib1            5.854552e-27 -0.4585173 0.206 0.255  1.639157e-22
## Gm2a             6.509143e-27 -0.3391206 0.238 0.293  1.822430e-22
## Ccdc88a          8.144919e-27 -0.4125294 0.203 0.252  2.280414e-22
## Lrpap1           9.669907e-26 -0.3189599 0.288 0.335  2.707380e-21
## Fkbp9            1.007308e-25 -0.2635459 0.375 0.422  2.820262e-21
## Ccnl2            1.031961e-24 -0.2579761 0.409 0.443  2.889285e-20
## Ehd1             4.599008e-24 -0.3559300 0.232 0.279  1.287630e-19
## Aig1             8.892658e-24 -0.2928997 0.272 0.324  2.489766e-19
## Smagp            5.536291e-23  0.2552426 0.326 0.266  1.550051e-18
## Col1a1           6.265026e-23  0.4973961 0.346 0.322  1.754082e-18
## Angptl4          2.359803e-22 -0.2857214 0.348 0.397  6.606977e-18
## Stat3            5.476788e-22 -0.2601620 0.358 0.397  1.533391e-17
## Ssbp4            1.164264e-19 -0.2699876 0.335 0.368  3.259707e-15
## Krit1            3.827358e-19 -0.2911402 0.283 0.322  1.071584e-14
## Crtap            2.070589e-17 -0.3083688 0.219 0.255  5.797235e-13
## Ptpn1            3.662145e-17 -0.2705752 0.308 0.339  1.025327e-12
## Tmem261          5.013855e-17 -0.3190849 0.230 0.266  1.403779e-12
## Golgb1           1.487002e-15 -0.2523959 0.336 0.363  4.163309e-11
## Lpp              6.412118e-15 -0.2915541 0.223 0.257  1.795265e-10
## Sorbs2           1.525936e-14 -0.2797653 0.219 0.255  4.272315e-10
```

```
## Ctgf        3.484936e-14 -0.2648335 0.226 0.266  9.757124e-10
## Snhg18      1.442311e-13 -0.2563952 0.225 0.260  4.038181e-09
## Hivep2      1.743104e-13 -0.2817380 0.223 0.257  4.880344e-09
## Serpinf1    8.335707e-05  0.3230853 0.278 0.281  1.000000e+00
```