```
>
> ReadFromWeb := proc(URL :: string, {printfile :: truefalse := false})
    local n, m, status, webfile, headers;
    status, webfile, headers := HTTP[Get](URL) :
    if (HTTP[Code](status) ≠ "OK") then
       error(HTTP[Code](status), URL);
    fi;
    # now read the web page
    n := 0 :
    while (n < length(webfile)) do
      m := n;
      parse(webfile, statement, lastread ='n', offset = n);
      if (printfile) then printf("%s", webfile[m + 1 ..n]); fi;
    od:
    end:
> ReadFromWeb("http://www.math.sunysb.edu/~scott/mat331.spr14/problems/fitquad.txt",
       printfile);
fitquad:= [[-1.9, -4.7], [-.8, 1.2], [.1, 2.8], [1.4, -1.2],
[1.8, -3.5]];
```
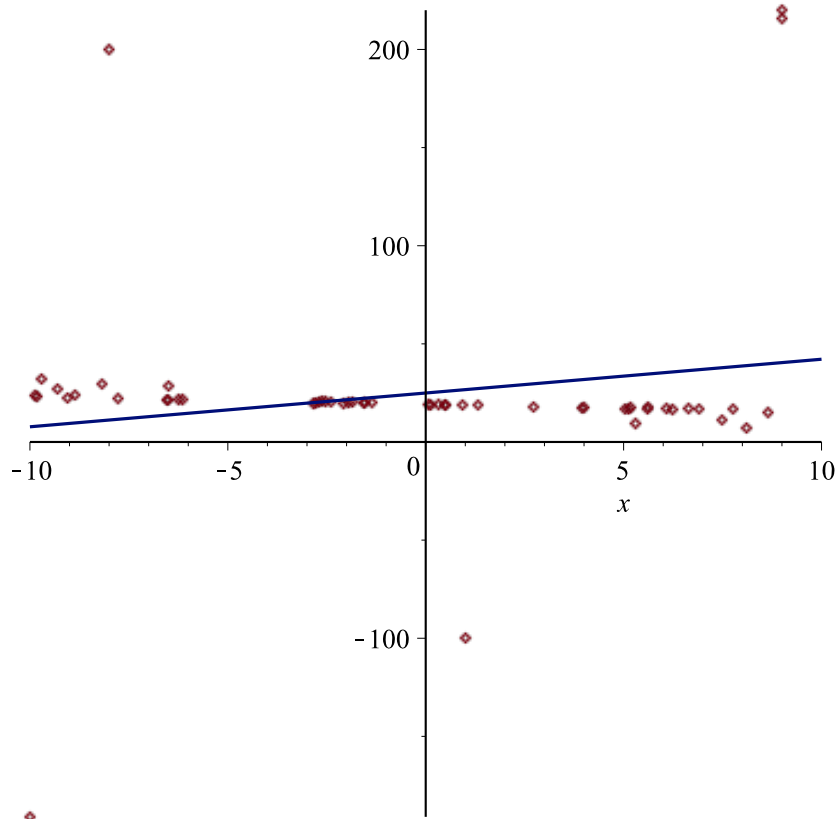
```
> plot(fitquad, style = point);
```
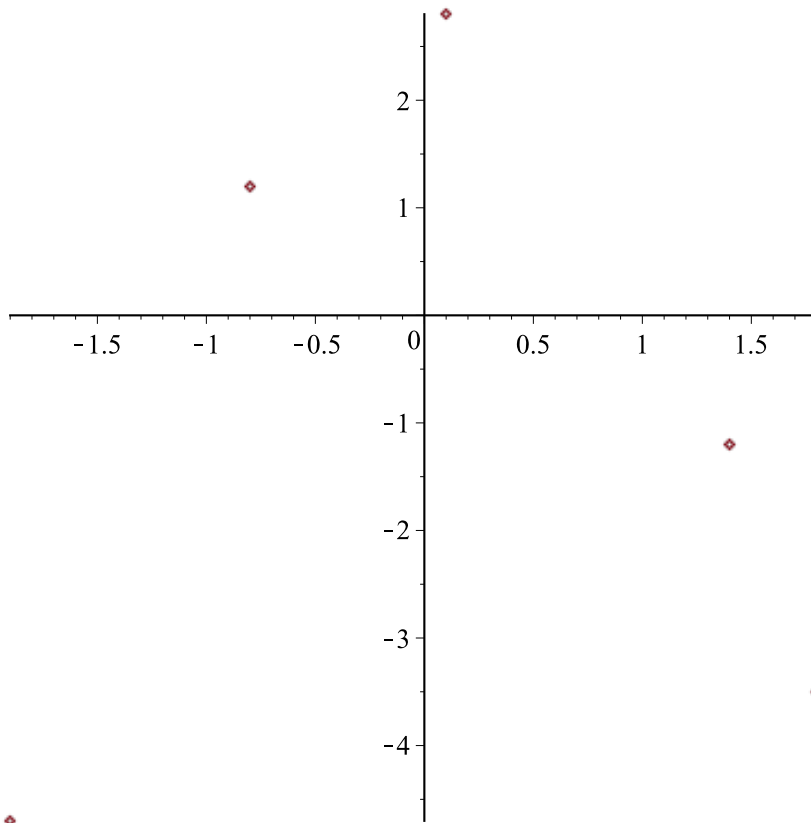
> *ReadFromWeb*("http://www.math.sunysb.edu/~scott/mat331.spr14/problems/bdata.txt");
> *plot*(*bdata, style = point*);
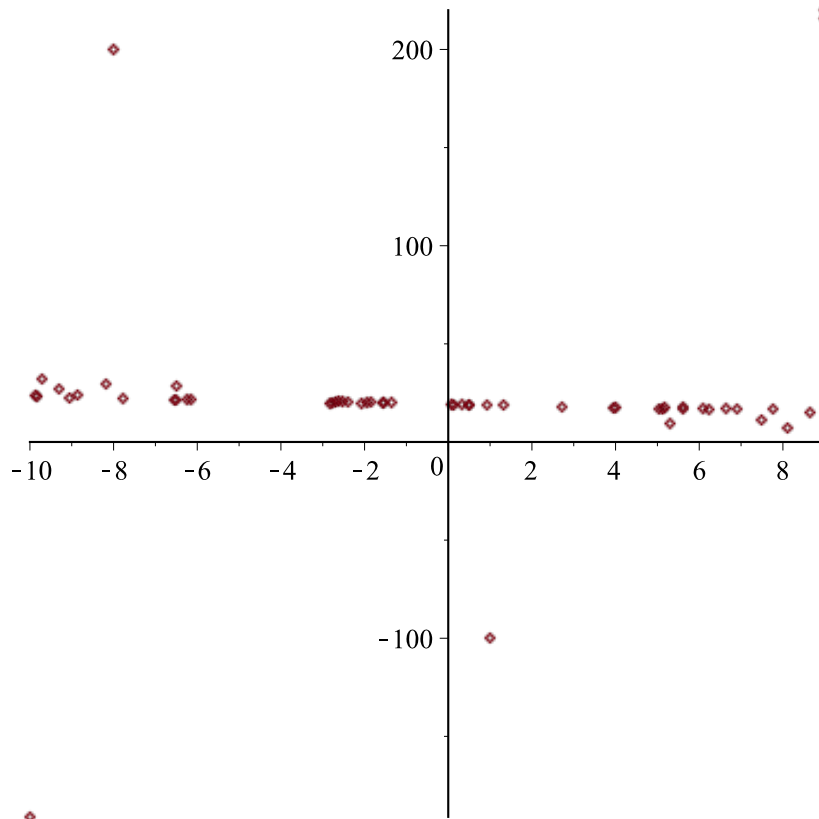
> $badline := CurveFitting[LeastSquares](bdata, x);$
$$badline := 24.9502982841361 + 1.72140920411782\ x \qquad\qquad \textbf{(1)}$$

> $plot([bdata, badline], x = -10..10, style = [point, line]);$

> $plot([bdata, badline], x = -10 ..10, y = 5 ..30, style = [point, line]);$

> $plot(\ln(1+|x|), x=-2..2);$
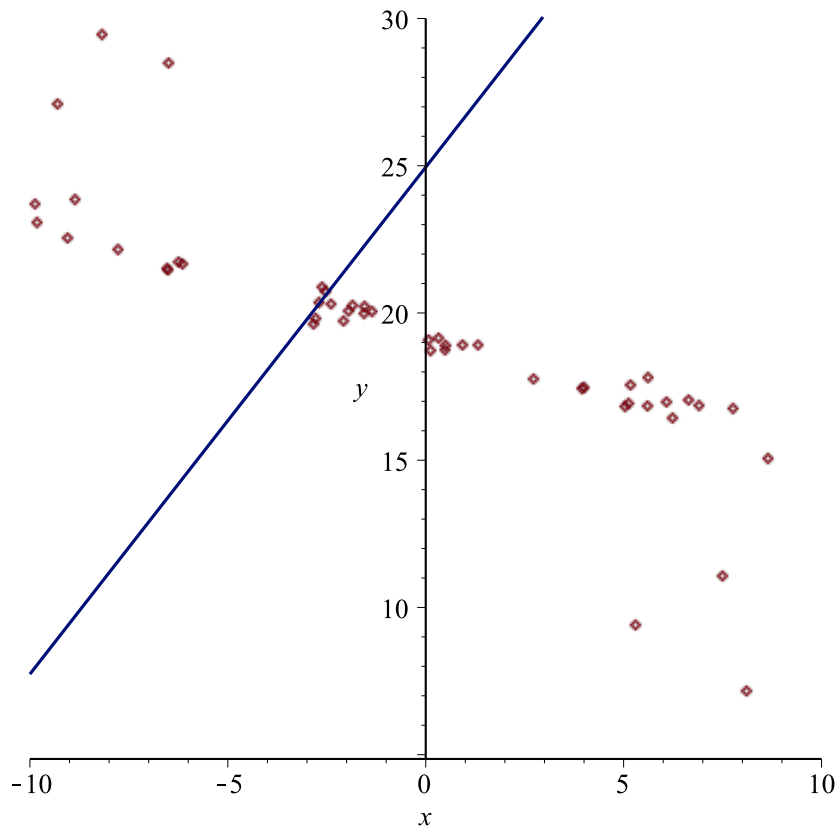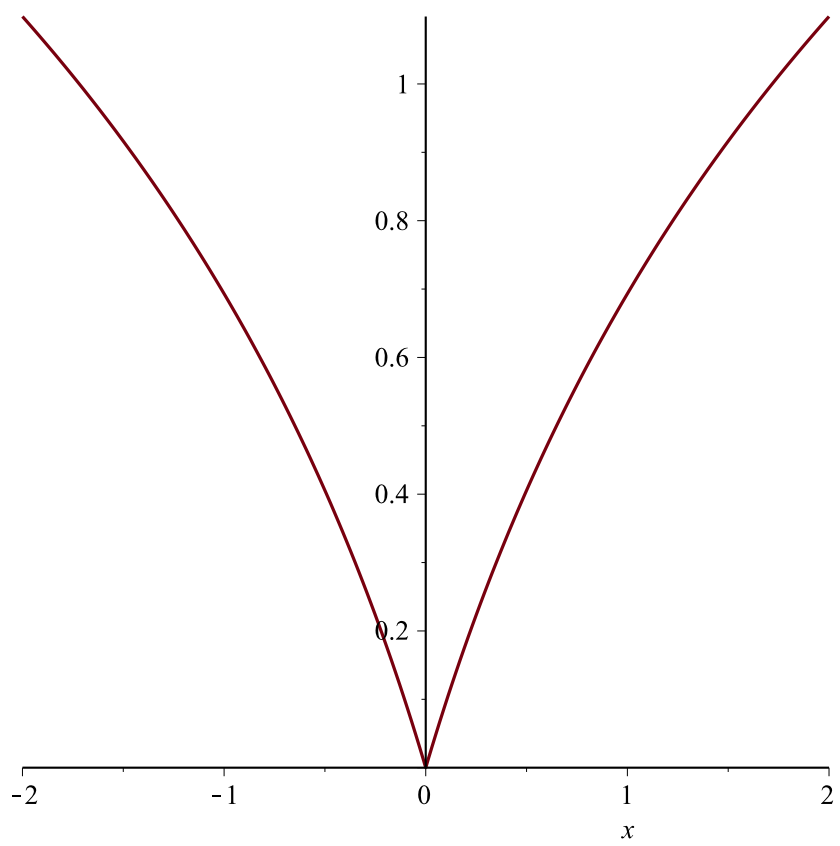
> $plot\left(\ln\left(1+v^2\right), v=-1..1\right);$
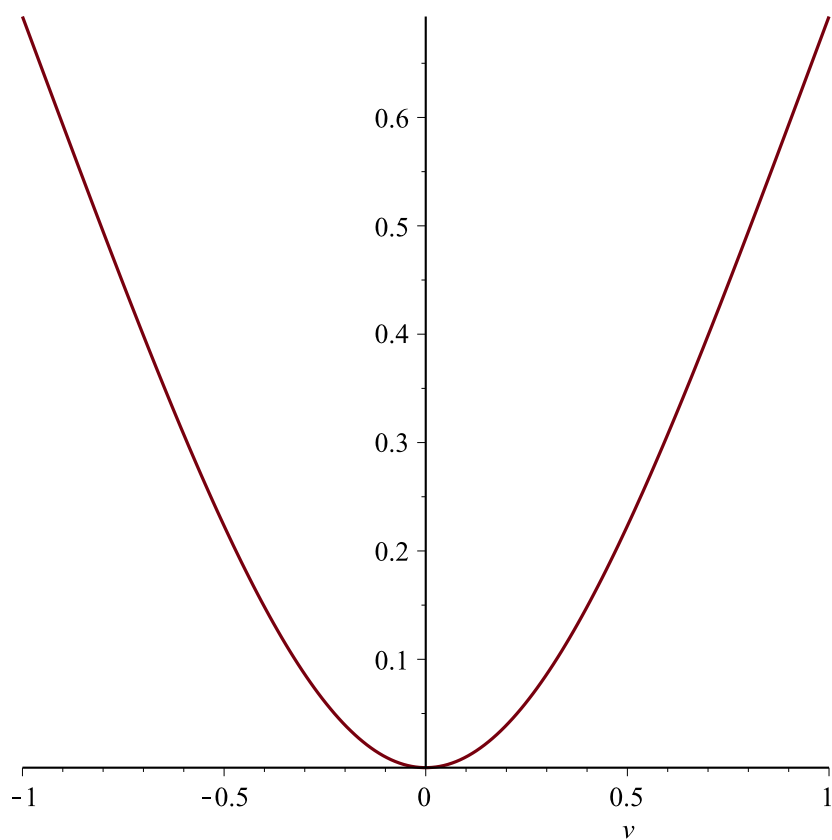
> $diff(\log(x), x); diff(\ln(x), x); diff(\log[10](x), x);$

$$\frac{1}{x}$$

$$\frac{1}{x}$$

$$\frac{1}{x\ln(10)}$$

(2)

> $Ruler := v \rightarrow \ln(1 + v^2);$

$$Ruler := v \rightarrow \ln(1 + v^2)$$

(3)

> $dr := (m, b, data) \rightarrow \dfrac{sum(Ruler(m \cdot data[i][1] + b - data[i][2]), i = 1 .. nops(data))}{nops(data)};$

$$dr := (m, b, data) \rightarrow \frac{\displaystyle\sum_{i=1}^{nops(data)} Ruler\left(m\, data_{i_1} + b - data_{i_2}\right)}{nops(data)}$$

(4)

> $dr(2, 0, [[0, 0], [1, 2], [2, 4]]);$

$$0$$

(5)

> $dr(2, 0, [[0, 0], [1, 3], [2, 4]]);$

$$\frac{1}{3}\ln(2) \qquad \text{(6)}$$

> $dr(2, 0, bdata); evalf(\%);$

$$5.160023678 + \frac{1}{54}\ln(29242) + \frac{1}{54}\ln(46657) + \frac{1}{54}\ln(40805) + \frac{1}{54}\ln(10405)$$

$$5.917441107 \qquad \text{(7)}$$

> $dr(2, 10, bdata); evalf(\%);$

$$4.573954213 + \frac{1}{54}\ln(32762) + \frac{1}{54}\ln(42437) + \frac{1}{54}\ln(36865) + \frac{1}{54}\ln(12545)$$

$$5.333304135 \qquad \text{(8)}$$

> $dr(-2, 10.0, bdata); evalf(\%);$

$$4.661574365$$
$$4.661574365 \qquad \text{(9)}$$

>

$$[[-8.857403420, 23.84930474], [-2.780958614, 19.81177275], [0.49220217, 18.73849995], \qquad \text{(10)}$$
$$[-6.543130054, 21.51666222], [6.08427501, 16.97527217], [-6.242938578,$$
$$21.72698882], [-6.514007062, 21.45289388]]$$

> $diff(dr(m, b, bdata), m);$

$$\frac{1}{54}\frac{-5.251281780\,b + 13.78798017\,m + 109.6821658}{1 + (b - 2.625640890\,m - 20.88674163)^2} \qquad \text{(11)}$$

$$+ \frac{1}{54}\frac{-5.381018728\,b + 14.47768128\,m + 109.5661849}{1 + (b - 2.690509364\,m - 20.36160632)^2}$$

$$+ \frac{1}{54}\frac{-17.71480684\,b + 156.9071907\,m + 422.4858268}{1 + (b - 8.857403420\,m - 23.84930474)^2}$$

$$+ \frac{1}{54}\frac{-5.561917228\,b + 15.46746163\,m + 110.1914402}{1 + (b - 2.780958614\,m - 19.81177275)^2}$$

$$+ \frac{1}{54}\frac{0.98440434\,b + 0.4845259524\,m - 18.44626068}{1 + (b + 0.49220217\,m - 18.73849995)^2}$$

$$+ \frac{1}{54}\frac{-13.08626011\,b + 85.62510180\,m + 281.5726384}{1 + (b - 6.543130054\,m - 21.51666222)^2}$$

$$+ \frac{1}{54}\frac{12.16855002\,b + 74.03680480\,m - 206.5644486}{1 + (b + 6.08427501\,m - 16.97527217)^2}$$

$$+ \frac{1}{54}\frac{-12.48587716\,b + 77.94856418\,m + 271.2805134}{1 + (b - 6.242938578\,m - 21.72698882)^2}$$

$$+ \frac{1}{54}\frac{-13.02801412\,b + 84.86457600\,m + 279.4886044}{1 + (b - 6.514007062\,m - 21.45289388)^2}$$

$$+ \frac{1}{54}\frac{15.52266664\,b + 120.4765898\,m - 260.0185246}{1 + (b + 7.76133332\,m - 16.75089278)^2}$$

$$+ \frac{1}{54}\frac{-18.10982218\,b + 163.9828296\,m + 408.2298482}{1 + (b - 9.054911088\,m - 22.54190263)^2}$$

$$+ \frac{1}{54} \frac{10.06609350\,b + 50.66311918\,m - 169.3844654}{1 + (b + 5.03304675\,m - 16.82722949)^2}$$

$$+ \frac{1}{54} \frac{-19.73944277\,b + 194.8228005\,m + 467.8796124}{1 + (b - 9.869721387\,m - 23.70277711)^2}$$

$$+ \frac{1}{54} \frac{-15.54168186\,b + 120.7719375\,m + 344.4412856}{1 + (b - 7.770840930\,m - 22.16242030)^2}$$

$$+ \frac{1}{54} \frac{-3.897036768\,b + 7.593447786\,m + 78.20164268}{1 + (b - 1.948518384\,m - 20.06695018)^2}$$

$$+ \frac{1}{54} \frac{8.00410054\,b + 32.03281272\,m - 139.8320619}{1 + (b + 4.00205027\,m - 17.47005315)^2}$$

$$+ \frac{1}{54} \frac{10.34642080\,b + 53.52421168\,m - 181.5802456}{1 + (b + 5.17321040\,m - 17.55005418)^2}$$

$$+ \frac{1}{54} \frac{-4.152169544\,b + 8.620255962\,m + 81.88448810}{1 + (b - 2.076084772\,m - 19.72089223)^2}$$

$$+ \frac{1}{54} \frac{-3.100125180\,b + 4.805388066\,m + 62.66563362}{1 + (b - 1.550062590\,m - 20.21390427)^2}$$

$$+ \frac{1}{54} \frac{-12.28785020\,b + 75.49563122\,m + 266.1155870}{1 + (b - 6.143925098\,m - 21.65680593)^2}$$

$$+ \frac{1}{54} \frac{11.21525102\,b + 62.89092772\,m - 188.9681968}{1 + (b + 5.60762551\,m - 16.84921688)^2}$$

$$+ \frac{1}{54} \frac{10.59050840\,b + 56.07943410\,m - 99.59226042}{1 + (b + 5.295254201\,m - 9.403916851)^2}$$

$$+ \frac{1}{54} \frac{16.21125896\,b + 131.4024586\,m - 116.1849329}{1 + (b + 8.105629482\,m - 7.166928438)^2}$$

$$+ \frac{1}{54} \frac{18\,b + 162\,m - 3881.879008}{1 + (b + 9\,m - 215.6599449)^2} + \frac{1}{54} \frac{-20\,b + 200\,m - 3820}{1 + (b - 10\,m + 191)^2}$$

$$+ \frac{1}{54} \frac{-16\,b + 128\,m + 3200}{1 + (b - 8\,m - 200)^2} + \frac{1}{54} \frac{18\,b + 162\,m - 3960}{1 + (b + 9\,m - 220)^2}$$

$$+ \frac{1}{54} \frac{2\,b + 2\,m + 200}{1 + (b + m + 100)^2} + \frac{1}{54} \frac{13.28162104\,b + 88.20072872\,m - 226.4453950}{1 + (b + 6.64081052\,m - 17.04952989)^2}$$

$$+ \frac{1}{54} \frac{5.43823592\,b + 14.78720496\,m - 96.57835592}{1 + (b + 2.71911796\,m - 17.75913317)^2}$$

$$+ \frac{1}{54} \frac{0.99166250\,b + 0.4916972570\,m - 18.73859106}{1 + (b + 0.49583125\,m - 18.89613761)^2}$$

$$+ \frac{1}{54} \frac{10.24893444\,b + 52.52032858\,m - 173.4046166}{1 + (b + 5.12446722\,m - 16.91928245)^2}$$

$$+ \frac{1}{54} \frac{-3.704884552\,b + 6.863084772\,m + 75.05756008}{1 + (b - 1.852442276\,m - 20.25908204)^2}$$

$$+ \frac{1}{54} \frac{13.80561364\,b + 95.29748398\,m - 232.6233216}{1 + (b + 6.90280682\,m - 16.84990814)^2}$$

$$+ \frac{1}{54} \cdot \frac{-5.064480308\, b + 12.82448040\, m + 104.9474152}{1 + (b - 2.532240154\, m - 20.72224765)^2}$$

$$+ \frac{1}{54} \cdot \frac{2.64403628\, b + 3.495463924\, m - 50.00778196}{1 + (b + 1.32201814\, m - 18.91342503)^2}$$

$$+ \frac{1}{54} \cdot \frac{1.86509012\, b + 1.739280578\, m - 35.26214882}{1 + (b + 0.93254506\, m - 18.90640481)^2}$$

$$+ \frac{1}{54} \cdot \frac{-16.36993348\, b + 133.9873610\, m + 482.0773670}{1 + (b - 8.184966738\, m - 29.44895089)^2}$$

$$+ \frac{1}{54} \cdot \frac{-18.61572007\, b + 173.2725169\, m + 504.3117132}{1 + (b - 9.307860036\, m - 27.09063691)^2}$$

$$+ \frac{1}{54} \cdot \frac{-19.42000252\, b + 188.5682489\, m + 623.8476750}{1 + (b - 9.710001259\, m - 32.12397498)^2}$$

$$+ \frac{1}{54} \cdot \frac{-12.99973756\, b + 84.49658826\, m + 370.2986424}{1 + (b - 6.499868778\, m - 28.48508601)^2}$$

$$+ \frac{1}{54} \cdot \frac{14.98421878\, b + 112.2634062\, m - 165.8500187}{1 + (b + 7.492109388\, m - 11.06831268)^2}$$

$$+ \frac{1}{54} \cdot \frac{17.30249526\, b + 149.6881711\, m - 260.5411708}{1 + (b + 8.65124763\, m - 15.05801139)^2}$$

$$+ \frac{1}{54} \cdot \frac{0.24437944\, b + 0.02986065534\, m - 4.574512422}{1 + (b + 0.12218972\, m - 18.71889232)^2}$$

$$+ \frac{1}{54} \cdot \frac{0.14923008\, b + 0.01113480839\, m - 2.847427740}{1 + (b + 0.07461504\, m - 19.08078948)^2}$$

$$+ \frac{1}{54} \cdot \frac{-3.119565776\, b + 4.865845316\, m + 62.34050316}{1 + (b - 1.559782888\, m - 19.98371172)^2}$$

$$+ \frac{1}{54} \cdot \frac{-19.65512368\, b + 193.1619435\, m + 453.4139232}{1 + (b - 9.827561842\, m - 23.06848486)^2}$$

$$+ \frac{1}{54} \cdot \frac{0.64622414\, b + 0.2088028196\, m - 12.37237615}{1 + (b + 0.32311207\, m - 19.14564218)^2}$$

$$+ \frac{1}{54} \cdot \frac{-4.783827184\, b + 11.44250126\, m + 97.12211522}{1 + (b - 2.391913592\, m - 20.30217888)^2}$$

$$+ \frac{1}{54} \cdot \frac{7.89234036\, b + 31.14451818\, m - 137.6114369}{1 + (b + 3.94617018\, m - 17.43607480)^2}$$

$$+ \frac{1}{54} \cdot \frac{-5.660753576\, b + 16.02206552\, m + 111.1281404}{1 + (b - 2.830376788\, m - 19.63133334)^2}$$

$$+ \frac{1}{54} \cdot \frac{-2.716656840\, b + 3.690112194\, m + 54.48942248}{1 + (b - 1.358328420\, m - 20.05752868)^2}$$

$$+ \frac{1}{54} \cdot \frac{12.46190874\, b + 77.64958472\, m - 204.7894918}{1 + (b + 6.23095437\, m - 16.43323636)^2}$$

$$+ \frac{1}{54} \cdot \frac{11.22296006\, b + 62.97741626\, m - 199.8923313}{1 + (b + 5.61148003\, m - 17.81101690)^2}$$

> $solve(\{diff(dr(m, b, bdata), m) = 0, diff(dr(m, b, bdata), b) = 0\});$
Warning, computation interrupted

> $plot3d(dr(m, b, bdata), m = -2..0, b = 15..25);$
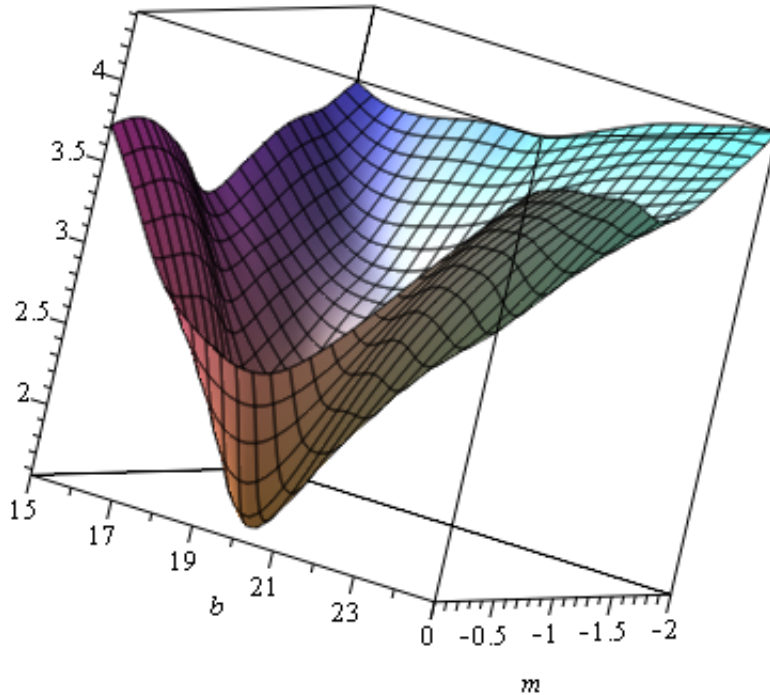


> $fsolve(\{diff(dr(m, b, bdata), m) = 0, diff(dr(m, b, bdata), b) = 0\}, \{m, b\}, \{m = -2..0, b = 17..21\});$

$$\{b = 19.23067355, m = -0.4096014757\} \tag{12}$$

> $betterline := subs(\%, m \cdot x + b);$

$$betterline := -0.4096014757\, x + 19.23067355 \tag{13}$$

> $plot([bdata, betterline, badline], x = -10..10, style = [point, line\$2]);$