Lab 8

Problem 1:

```
R := rand(1..10^12); for n from 1 to 10 do R();end do;
R := proc()
    proc() option builtin = RandNumberInterface;  end proc(6, 1000000000000, 40) + 1
end proc
```

736602622345
329844591803
615732069249
847018765389
471077852199
392554592839
836404711118
474259255347
224085044620
78606118335 **(1)**

Problem 2:

```
R := rand(100..200); for n from 1 to 10 do R();end do;
R := proc()
    proc() option builtin = RandNumberInterface;  end proc(6, 101, 7) + 100
end proc
```

139
189
102
148
148
166
200
200
173
189 **(2)**

Problem 3:

```
R := rand(3000..7000); for n from 1 to 1do R( );end do;
R := proc( )
    proc( ) option builtin = RandNumberInterface;  end proc(6, 4001, 12) + 3000
end proc
```

3771 **(3)**

Problem 4:

```
for n from 3000 to 7000 do n; a := rand( ); isprime(a);end do;
```

3000

$a := 54827477138$

false **(4)**

Problem 5:

```
N := 0 : for n from 3000 to 7000 do a := rand( ); if isprime(a)
    then print(a); N := N + 1 : end if: end do: print("There are", N, "primes.");
```

671676067781

994161908939

733315959449

311560103089

818823967879

106394845621

432487170721

378884916229

682307010751

335393784311

789804766397

78208799323

316694857253

676167374387

103005492853
842505655141
115329595253
665509023979
741840381349
581584223459
434807220139
718808460709
47836327367
184100111813
510379001141
293950287667
445067082029
545373938881
138535296283
709398747839
506292195967
568685692147
147549806711
926769958451
747537476899
713795362759
995595376871
37014459787
834227188051
569393431799
96374726761
675573885607
734736958531
997016559949
549937290971
751001880047
103374701009
122086579253

623145933607
824992340143
607022213521
657668756821
904813241099
438471544543
242263127641
945025582069
129924074491
394304179817
307157905591
194512906901
671049576403
219280902937
606406541941
19397929493
406952383501
387315116141
418549389641
712211434967
66101397067
130286198179
312347915353
480933887323
524666359013
145853296483
146684034139
975182225401
410794975957
763631232677
393009050503
577292198599
602416399331
771592910923

139153476071
981929033593
488082483689
381574247183
182318802707
10860300557
864261894311
437018523701
488594549623
654541664767
228277927211
445742511139
953168603969
201028135381
43890536609
115352272289
475144790303
532461461101
734662496731
321387651443
337798244897
210732888391
631033587461
861276872111
948958994413
683255564807
667419442871
2980273339
480293371829
250166690639
438913789367
308231122393
145315540691
152469113261

705029107213

887516788219

402225170231

829507228931

62416769209

230015952721

300129215773

844734347923

"There are", 124, "primes." **(5)**

Problem 6:

for n **from** 1 **to** 15 **do** *randpoly*(x) **end do**;

$$2x^5 + 73x^4 - 25x^3 - 82x^2 - 23x + 41$$

$$70x^5 - 57x^4 - 35x^3 - 6x^2 + 64x - 70$$

$$-68x^5 + 47x^4 + 56x^3 + 92x^2 + 95x - 65$$

$$-55x^5 - 85x^4 + 83x^3 + 92x^2 + 17x + 1$$

$$71x^5 + 47x^4 - 73x^3 - 92x^2 - 39x + 45$$

$$29x^5 - 15x^4 + 38x^3 - 5x^2 + 53x + 73$$

$$54x^5 + 48x^4 + 64x^3 + 35x^2 - 97x + 25$$

$$26x^5 - 20x^4 - 70x^3 - 84x^2 - 73x + 71$$

$$-63x^5 - 61x^4 - 97x^3 - 90x^2 - 69x + 38$$

$$58x^5 - 8x^4 - 78x^3 - 20x^2 - 19x + 72$$

$$-49x^5 - 44x^4 + 99x^3 + 68x^2 - 89x - 88$$

$$93x^5 + 42x^4 + 64x^3 + 75x^2 + 25x - 77$$

$$-73x^5 + 83x^4 + 28x^3 + 55x^2 - 16x - 11$$

$$-53x^5 - 22x^4 - 83x^3 - 40x^2 + 80x + 36$$

$$82x^5 - 11x^4 + 28x^3 - 4x^2 - 19x - 96$$ **(6)**

Problem 7:

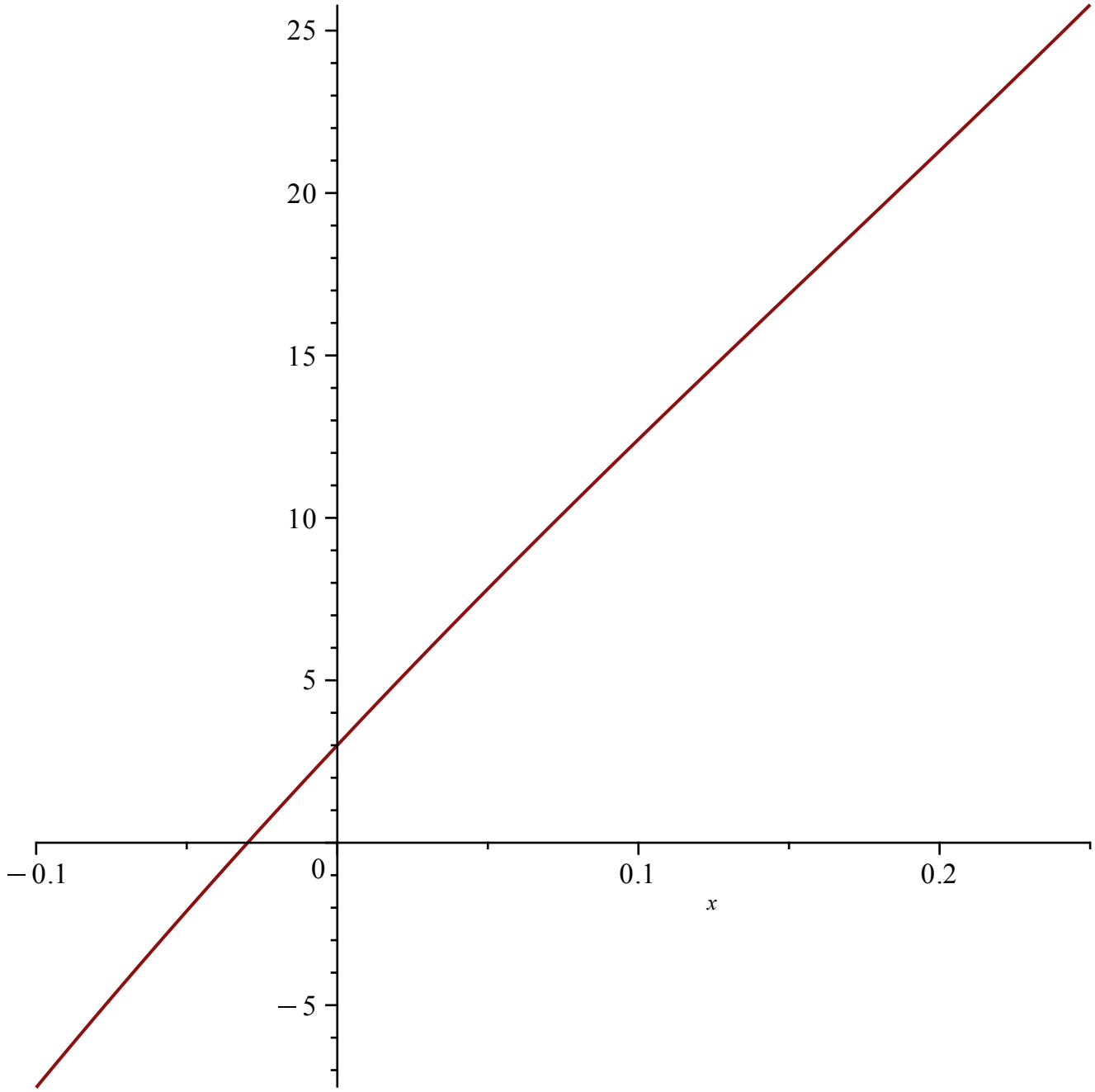
$f(x) = randpoly(x);$

$$f(x) = 65\,x^5 + 92\,x^4 + 76\,x^3 - 57\,x^2 + 99\,x + 3 \quad \textbf{(7)}$$

$with(plots)$

[*animate*, *animate3d*, *animatecurve*, *arrow*, *changecoords*, *complexplot*, *complexplot3d*, *conformal*, *conformal3d*, *contourplot*, *contourplot3d*, *coordplot*, *coordplot3d*, *densityplot*, *display*, *dualaxisplot*, *fieldplot*, *fieldplot3d*, *gradplot*, *gradplot3d*, *implicitplot*, *implicitplot3d*, *inequal*, *interactive*, *interactiveparams*, *intersectplot*, *listcontplot*, *listcontplot3d*, *listdensityplot*, *listplot*, *listplot3d*, *loglogplot*, *logplot*, *matrixplot*, *multiple*, *odeplot*, *pareto*, *plotcompare*, *pointplot*, *pointplot3d*, *polarplot*, *polygonplot*, *polygonplot3d*, *polyhedra_supported*, *polyhedraplot*, *rootlocus*, *semilogplot*, *setcolors*, *setoptions*, *setoptions3d*, *shadebetween*, *spacecurve*, *sparsematrixplot*, *surfdata*, *textplot*, *textplot3d*, *tubeplot*] **(8)**

$plot\left(65\,x^5 + 92\,x^4 + 76\,x^3 - 57\,x^2 + 99\,x + 3\right)$



$$f(x) = 65\,x^5 + 92\,x^4 + 76\,x^3 - 57\,x^2 + 99\,x + 3 \xrightarrow{\text{differentiate w.r.t. x}}$$

$$\frac{d}{dx} f(x) = 325\,x^4 + 368\,x^3 + 228\,x^2 - 114\,x + 99$$

$$f(x) = 65\,x^5 + 92\,x^4 + 76\,x^3 - 57\,x^2 + 99\,x + 3 \xrightarrow{\text{integrate w.r.t. x}}$$

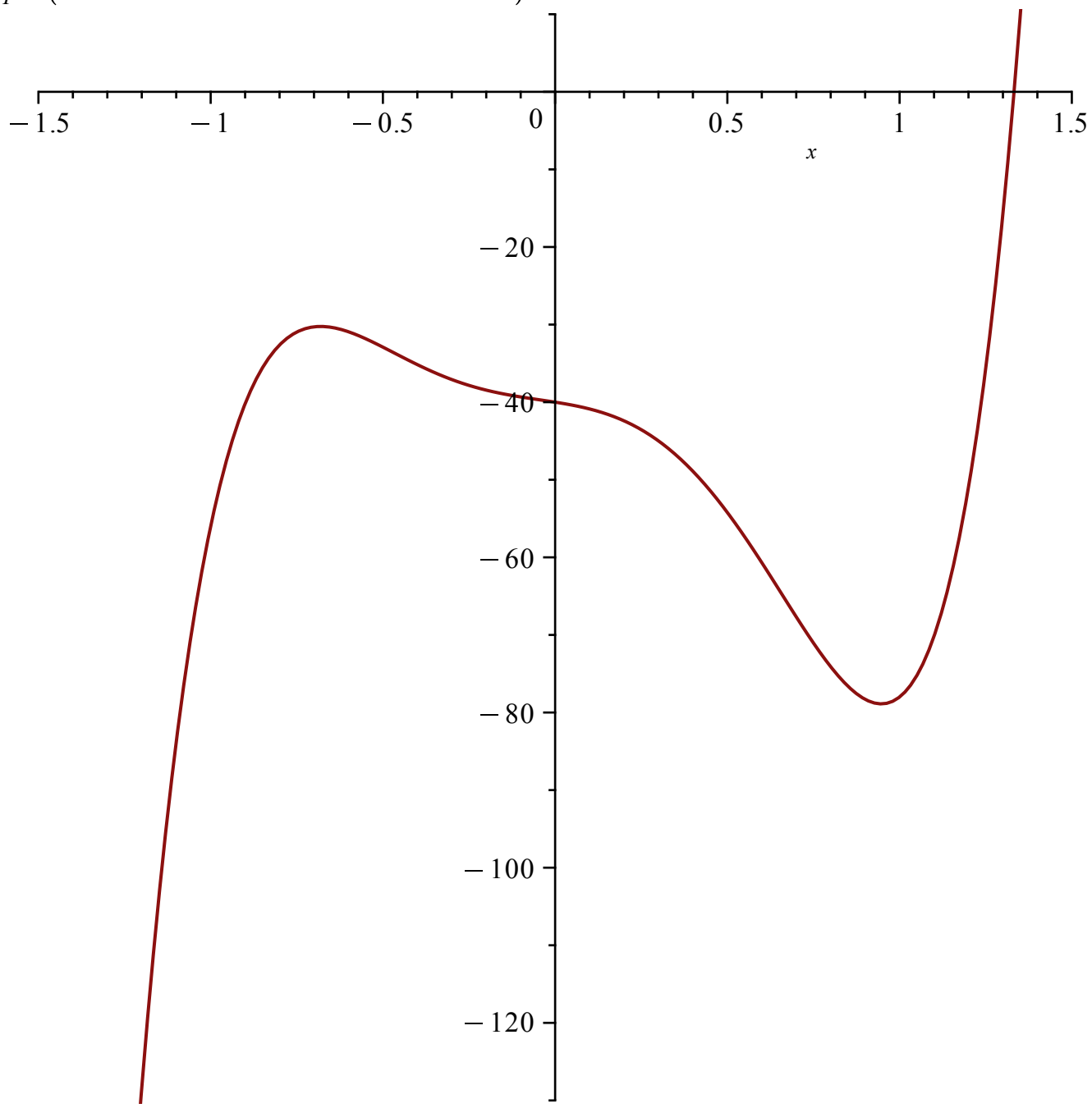
$$\int f(x)\,dx = \frac{65}{6}\,x^6 + \frac{92}{5}\,x^5 + 19\,x^4 - 19\,x^3 + \frac{99}{2}\,x^2 + 3\,x$$

Problem 8:

$g(x) = randpoly(x);$

$$g(x) = 71\,x^5 - 17\,x^4 - 75\,x^3 - 10\,x^2 - 7\,x - 40 \qquad \textbf{(9)}$$

$plot(71\,x^5 - 17\,x^4 - 75\,x^3 - 10\,x^2 - 7\,x - 40)$



$$71\,x^5 - 17\,x^4 - 75\,x^3 - 10\,x^2 - 7\,x - 40 \xrightarrow{\text{differentiate w.r.t. x}} 355\,x^4 - 68\,x^3 - 225\,x^2 - 20\,x - 7$$

$$71\,x^5 - 17\,x^4 - 75\,x^3 - 10\,x^2 - 7\,x - 40 \xrightarrow{\text{integrate w.r.t. x}}$$
$$\frac{71}{6}\,x^6 - \frac{17}{5}\,x^5 - \frac{75}{4}\,x^4 - \frac{10}{3}\,x^3 - \frac{7}{2}\,x^2 - 40\,x$$