

Maxima 5.9.1 <http://maxima.sourceforge.net>
Using Lisp CMU Common Lisp 19a
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Dedicated to the memory of William Schelter.
This is a development version of Maxima. The function bug_report()
provides bug reporting information.

```
(%i1) load("tensor.lisp");
```

```
(%o1) tensor.lisp
```

```
(%i2) a : [1,2] ot [sin(x),cos(x),tan(x)] ot [1,x,x^2,x^4];
```

```
(%o2) [[ [sin x, x sin x, x^2 sin x, x^4 sin x], [cos x, x cos x, x^2 cos x, x^4 cos x], [tan x, x tan x, x^2 tan x, x^4 tan x] ], [ [2 sin x, 2 x sin x, 2 x^2 sin x, 2 x^4 sin x], [2 cos x, 2 x cos x, 2 x^2 cos x, 2 x^4 cos x], [2 tan x, 2 x tan x, 2 x^2 tan x, 2 x^4 tan x] ] ]
```

```
(%i3) tensortype(a);
```

```
(%o3) [2,3,4]
```

```
(%i4) tensorrank(a);
```

```
(%o4) 3
```

```
(%i5) b : [s,t];
```

```
(%o5) [s,t]
```

```
(%i6) c : a ot b;
```

```
(%o6) [[ [ [ [s sin x, t sin x], [s x sin x, t x sin x], [s x^2 sin x, t x^2 sin x], [s x^4 sin x, t x^4 sin x] ], [s cos x, t cos x], [s x cos x, t x cos x], [s x^2 cos x, t x^2 cos x], [s x^4 cos x, t x^4 cos x] ], [ [s tan x, t tan x], [s x tan x, t x tan x], [s x^2 tan x, t x^2 tan x], [s x^4 tan x, t x^4 tan x] ] ], [ [ [2 s sin x, 2 t sin x], [2 s x sin x, 2 t x sin x], [2 s x^2 sin x, 2 t x^2 sin x], [2 s x^4 sin x, 2 t x^4 sin x] ], [ [2 s cos x, 2 t cos x], [2 s x cos x, 2 t x cos x], [2 s x^2 cos x, 2 t x^2 cos x], [2 s x^4 cos x, 2 t x^4 cos x] ], [ [2 s tan x, 2 t tan x], [2 s x tan x, 2 t x tan x], [2 s x^2 tan x, 2 t x^2 tan x], [2 s x^4 tan x, 2 t x^4 tan x] ] ] ] ]
```

```
(%i7) tensortype(c);
```

```
(%o7) [2,3,4,2]
```

```
(%i8) d : b ot a;
```

```
(%o8) [[ [ [ [s sin x, s x sin x, s x^2 sin x, s x^4 sin x], [s cos x, s x cos x, s x^2 cos x, s x^4 cos x], [s tan x, s x tan x, s x^2 tan x, s x^4 tan x] ], [ [2 s sin x, 2 s x sin x, 2 s x^2 sin x, 2 s x^4 sin x], [2 s cos x, 2 s x cos x, 2 s x^2 cos x, 2 s x^4 cos x], [2 s tan x, 2 s x tan x, 2 s x^2 tan x, 2 s x^4 tan x] ] ], [ [ [t sin x, t x sin x, t x^2 sin x, t x^4 sin x], [t cos x, t x cos x, t x^2 cos x, t x^4 cos x], [t tan x, t x tan x, t x^2 tan x, t x^4 tan x] ], [ [2 t sin x, 2 t x sin x, 2 t x^2 sin x, 2 t x^4 sin x], [2 t cos x, 2 t x cos x, 2 t x^2 cos x, 2 t x^4 cos x], [2 t tan x, 2 t x tan x, 2 t x^2 tan x, 2 t x^4 tan x] ] ] ] ]
```

```
(%i9) tensortype(d);
```

```
(%o9) [2, 2, 3, 4]
```

```
(%i10) e : [-1, 2, 0, 3];
```

```
(%o10) [-1, 2, 0, 3]
```

```
(%i11) tensortype(e);
```

```
(%o11) [4]
```

```
(%i12) load(eigen);
```

Warning - you are redefining the MACSYMA function EIGENVALUES

Warning - you are redefining the MACSYMA function EIGENVECTORS

```
(%o12) /usr/local/share/maxima/5.9.1/share/matrix/eigen.mac
```

```
(%i13) f : d tv c e;
```

```
(%o13) [[[(3 s x^4 + 2 s x - s) sin x, (3 s x^4 + 2 s x - s) cos x, (3 s x^4 + 2 s x - s) tan x], [(6 s x^4 + 4 s x - 2 s) sin x, (6 s x^4 + 4 s x - 2 s) cos x, (6 s x^4 + 4 s x - 2 s) tan x]], [(3 t x^4 + 2 t x - t) sin x, (3 t x^4 + 2 t x - t) cos x, (3 t x^4 + 2 t x - t) tan x], [(6 t x^4 + 4 t x - 2 t) sin x, (6 t x^4 + 4 t x - 2 t) cos x, (6 t x^4 + 4 t x - 2 t) tan x]]]
```

```
(%i14) tensortype(f);
```

```
(%o14) [2, 2, 3]
```

```
(%i15) g : d o t e;
```

```
(%o15) [[[[[- s sin x, 2 s sin x, 0, 3 s sin x], [- s x sin x, 2 s x sin x, 0, 3 s x sin x], [- s x^2 sin x, 2 s x^2 sin x, 0, 3 s x^2 sin x], [- s x^4 sin x, 2 s x^4 sin x, 0, 3 s x^4 sin x]], [[- s cos x, 2 s cos x, 0, 3 s cos x], [- s x cos x, 2 s x cos x, 0, 3 s x cos x], [- s x^2 cos x, 2 s x^2 cos x, 0, 3 s x^2 cos x], [- s x^4 cos x, 2 s x^4 cos x, 0, 3 s x^4 cos x]], [[- s tan x, 2 s tan x, 0, 3 s tan x], [- s x tan x, 2 s x tan x, 0, 3 s x tan x], [- s x^2 tan x, 2 s x^2 tan x, 0, 3 s x^2 tan x], [- s x^4 tan x, 2 s x^4 tan x, 0, 3 s x^4 tan x]]], [[[- 2 s sin x, 4 s sin x, 0, 6 s sin x], [- 2 s x sin x, 4 s x sin x, 0, 6 s x sin x], [- 2 s x^2 sin x, 4 s x^2 sin x, 0, 6 s x^2 sin x], [- 2 s x^4 sin x, 4 s x^4 sin x, 0, 6 s x^4 sin x]], [[- 2 s cos x, 4 s cos x, 0, 6 s cos x], [- 2 s x cos x, 4 s x cos x, 0, 6 s x cos x], [- 2 s x^2 cos x, 4 s x^2 cos x, 0, 6 s x^2 cos x], [- 2 s x^4 cos x, 4 s x^4 cos x, 0, 6 s x^4 cos x]], [[- 2 s tan x, 4 s tan x, 0, 6 s tan x], [- 2 s x tan x, 4 s x tan x, 0, 6 s x tan x], [- 2 s x^2 tan x, 4 s x^2 tan x, 0, 6 s x^2 tan x], [- 2 s x^4 tan x, 4 s x^4 tan x, 0, 6 s x^4 tan x]]], [[[- t sin x, 2 t sin x, 0, 3 t sin x], [- t x sin x, 2 t x sin x, 0, 3 t x sin x], [- t x^2 sin x, 2 t x^2 sin x, 0, 3 t x^2 sin x], [- t x^4 sin x, 2 t x^4 sin x, 0, 3 t x^4 sin x]], [[- t cos x, 2 t cos x, 0, 3 t cos x], [- t x cos x, 2 t x cos x, 0, 3 t x cos x], [- t x^2 cos x, 2 t x^2 cos x, 0, 3 t x^2 cos x], [- t x^4 cos x, 2 t x^4 cos x, 0, 3 t x^4 cos x]], [[- t tan x, 2 t tan x, 0, 3 t tan x], [- t x tan x, 2 t x tan x, 0, 3 t x tan x], [- t x^2 tan x, 2 t x^2 tan x, 0, 3 t x^2 tan x], [- t x^4 tan x, 2 t x^4 tan x, 0, 3 t x^4 tan x]]], [[[- 2 t sin x, 4 t sin x, 0, 6 t sin x], [- 2 t x sin x, 4 t x sin x, 0, 6 t x sin x], [- 2 t x^2 sin x, 4 t x^2 sin x, 0, 6 t x^2 sin x], [- 2 t x^4 sin x, 4 t x^4 sin x, 0, 6 t x^4 sin x]], [[- 2 t cos x, 4 t cos x, 0, 6 t cos x], [- 2 t x cos x, 4 t x cos x, 0, 6 t x cos x], [- 2 t x^2 cos x, 4 t x^2 cos x, 0, 6 t x^2 cos x], [- 2 t x^4 cos x, 4 t x^4 cos x, 0, 6 t x^4 cos x]], [[- 2 t tan x, 4 t tan x, 0, 6 t tan x], [- 2 t x tan x, 4 t x tan x, 0, 6 t x tan x], [- 2 t x^2 tan x, 4 t x^2 tan x, 0, 6 t x^2 tan x], [- 2 t x^4 tan x, 4 t x^4 tan x, 0, 6 t x^4 tan x]]]]]
```

```

(%i16) tensor(g);

(%o16) [2, 2, 3, 4, 4]

(%i17) ff : cntrlst2(g);

(%o17) [[[3 s x^4 sin x + 2 s x sin x - s sin x, 3 s x^4 cos x + 2 s x cos x - s cos x, 3 s x^4 tan x +
2 s x tan x - s tan x], [6 s x^4 sin x + 4 s x sin x - 2 s sin x, 6 s x^4 cos x + 4 s x cos x - 2 s cos x,
6 s x^4 tan x + 4 s x tan x - 2 s tan x]], [[3 t x^4 sin x + 2 t x sin x - t sin x, 3 t x^4 cos x + 2 t x cos x -
t cos x, 3 t x^4 tan x + 2 t x tan x - t tan x], [6 t x^4 sin x + 4 t x sin x - 2 t sin x, 6 t x^4 cos x +
4 t x cos x - 2 t cos x, 6 t x^4 tan x + 4 t x tan x - 2 t tan x]]]

(%i18) tensor(ff);

(%o18) [2, 2, 3]

(%i19) ff[2][1][3];

(%o19) 3 t x^4 tan x + 2 t x tan x - t tan x

(%i20) ratsimp(f - ff);

(%o20) [[[0, 0, 0], [0, 0, 0]], [[0, 0, 0], [0, 0, 0]]]

(%i21) fff : ctrtct(g, 4, 5);

(%o21) [[[3 s x^4 sin x + 2 s x sin x - s sin x, 3 s x^4 cos x + 2 s x cos x - s cos x, 3 s x^4 tan x +
2 s x tan x - s tan x], [6 s x^4 sin x + 4 s x sin x - 2 s sin x, 6 s x^4 cos x + 4 s x cos x - 2 s cos x,
6 s x^4 tan x + 4 s x tan x - 2 s tan x]], [[3 t x^4 sin x + 2 t x sin x - t sin x, 3 t x^4 cos x + 2 t x cos x -
t cos x, 3 t x^4 tan x + 2 t x tan x - t tan x], [6 t x^4 sin x + 4 t x sin x - 2 t sin x, 6 t x^4 cos x +
4 t x cos x - 2 t cos x, 6 t x^4 tan x + 4 t x tan x - 2 t tan x]]]

(%i22) ratsimp(ff - fff);

(%o22) [[[0, 0, 0], [0, 0, 0]], [[0, 0, 0], [0, 0, 0]]]

(%i23) tensor(ff);

(%o23) [2, 2, 3]

(%i24) ctrtct(ff, 1, 2);

(%o24) [6 t x^4 sin x + 3 s x^4 sin x + 4 t x sin x + 2 s x sin x - 2 t sin x - s sin x, 6 t x^4 cos x +
3 s x^4 cos x + 4 t x cos x + 2 s x cos x - 2 t cos x - s cos x, 6 t x^4 tan x + 3 s x^4 tan x + 4 t x tan x +
2 s x tan x - 2 t tan x - s tan x]

(%i25) tensor(%o24);

(%o25) [3]

(%i26) kill(a, b, c, d, e, f, ff, fff, g);

(%o26) DONE

```

```
(%i27) a : ([1,2] ot [3,4,5]) ot ([6,5,4,3] ot [-1,2,-3,4,-5]);
```

```
(%o27) [[[-18, 36, -54, 72, -90], [-15, 30, -45, 60, -75], [-12, 24, -36, 48, -60], [-9, 18, -27, 36, -45]], [[-24, 48, -72, 96, -120], [-20, 40, -60, 80, -100], [-16, 32, -48, 64, -80], [-12, 24, -36, 48, -60]], [[-30, 60, -90, 120, -150], [-25, 50, -75, 100, -125], [-20, 40, -60, 80, -100], [-15, 30, -45, 60, -75]]], [[[-36, 72, -108, 144, -180], [-30, 60, -90, 120, -150], [-24, 48, -72, 96, -120], [-18, 36, -54, 72, -90]], [[-48, 96, -144, 192, -240], [-40, 80, -120, 160, -200], [-32, 64, -96, 128, -160], [-24, 48, -72, 96, -120]], [[-60, 120, -180, 240, -300], [-50, 100, -150, 200, -250], [-40, 80, -120, 160, -200], [-30, 60, -90, 120, -150]]]]
```

```
(%i28) tensorstype(a);
```

```
(%o28) [2, 3, 4, 5]
```

```
(%i29) b : [x,y];
```

```
(%o29) [x, y]
```

```
(%i30) c : a ot b;
```

```
(%o30) [[[[[-18 x, -18 y], [36 x, 36 y], [-54 x, -54 y], [72 x, 72 y], [-90 x, -90 y]], [[-15 x, -15 y], [30 x, 30 y], [-45 x, -45 y], [60 x, 60 y], [-75 x, -75 y]], [[-12 x, -12 y], [24 x, 24 y], [-36 x, -36 y], [48 x, 48 y], [-60 x, -60 y]], [[-9 x, -9 y], [18 x, 18 y], [-27 x, -27 y], [36 x, 36 y], [-45 x, -45 y]]], [[[-24 x, -24 y], [48 x, 48 y], [-72 x, -72 y], [96 x, 96 y], [-120 x, -120 y]], [[-20 x, -20 y], [40 x, 40 y], [-60 x, -60 y], [80 x, 80 y], [-100 x, -100 y]], [[-16 x, -16 y], [32 x, 32 y], [-48 x, -48 y], [64 x, 64 y], [-80 x, -80 y]], [[-12 x, -12 y], [24 x, 24 y], [-36 x, -36 y], [48 x, 48 y], [-60 x, -60 y]]], [[[-30 x, -30 y], [60 x, 60 y], [-90 x, -90 y], [120 x, 120 y], [-150 x, -150 y]], [[-25 x, -25 y], [50 x, 50 y], [-75 x, -75 y], [100 x, 100 y], [-125 x, -125 y]], [[-20 x, -20 y], [40 x, 40 y], [-60 x, -60 y], [80 x, 80 y], [-100 x, -100 y]], [[-15 x, -15 y], [30 x, 30 y], [-45 x, -45 y], [60 x, 60 y], [-75 x, -75 y]]], [[[-36 x, -36 y], [72 x, 72 y], [-108 x, -108 y], [144 x, 144 y], [-180 x, -180 y]], [[-30 x, -30 y], [60 x, 60 y], [-90 x, -90 y], [120 x, 120 y], [-150 x, -150 y]], [[-24 x, -24 y], [48 x, 48 y], [-72 x, -72 y], [96 x, 96 y], [-120 x, -120 y]], [[-18 x, -18 y], [36 x, 36 y], [-54 x, -54 y], [72 x, 72 y], [-90 x, -90 y]], [[[-48 x, -48 y], [96 x, 96 y], [-144 x, -144 y], [192 x, 192 y], [-240 x, -240 y]], [[-40 x, -40 y], [80 x, 80 y], [-120 x, -120 y], [160 x, 160 y], [-200 x, -200 y]], [[-32 x, -32 y], [64 x, 64 y], [-96 x, -96 y], [128 x, 128 y], [-160 x, -160 y]], [[-24 x, -24 y], [48 x, 48 y], [-72 x, -72 y], [96 x, 96 y], [-120 x, -120 y]], [[[-60 x, -60 y], [120 x, 120 y], [-180 x, -180 y], [240 x, 240 y], [-300 x, -300 y]], [[-50 x, -50 y], [100 x, 100 y], [-150 x, -150 y], [200 x, 200 y], [-250 x, -250 y]], [[-40 x, -40 y], [80 x, 80 y], [-120 x, -120 y], [160 x, 160 y], [-200 x, -200 y]], [[-30 x, -30 y], [60 x, 60 y], [-90 x, -90 y], [120 x, 120 y], [-150 x, -150 y]]]]]]]
```

```
(%i31) tensorstype(c);
```

```
(%o31) [2, 3, 4, 5, 2]
```

```
(%i32) d : exchnext(c, 4)$
```

```
(%i33) tensorstype(d);
```

```
(%o33) [2, 3, 4, 2, 5]
```

```
(%i34) f : exchnext(d, 3)$
```

```
(%i35) tensorstype(f);
```

```

(%o35) [2, 3, 2, 4, 5]

(%i36) g : exchnext(f, 2)$
(%i37) tensortype(g);

(%o37) [2, 2, 3, 4, 5]

(%i38) h : exchnext(g, 1);

(%o38) [[[[[- 18 x, 36 x, - 54 x, 72 x, - 90 x], [- 15 x, 30 x, - 45 x, 60 x, - 75 x], [- 12 x, 24 x, -
36 x, 48 x, - 60 x], [- 9 x, 18 x, - 27 x, 36 x, - 45 x]], [[- 24 x, 48 x, - 72 x, 96 x, - 120 x], [- 20 x,
40 x, - 60 x, 80 x, - 100 x], [- 16 x, 32 x, - 48 x, 64 x, - 80 x], [- 12 x, 24 x, - 36 x, 48 x, - 60 x]],
[[ - 30 x, 60 x, - 90 x, 120 x, - 150 x], [- 25 x, 50 x, - 75 x, 100 x, - 125 x], [- 20 x, 40 x, - 60 x,
80 x, - 100 x], [- 15 x, 30 x, - 45 x, 60 x, - 75 x]]], [[[- 36 x, 72 x, - 108 x, 144 x, - 180 x], [- 30 x,
60 x, - 90 x, 120 x, - 150 x], [- 24 x, 48 x, - 72 x, 96 x, - 120 x], [- 18 x, 36 x, - 54 x, 72 x, - 90 x]],
[[ - 48 x, 96 x, - 144 x, 192 x, - 240 x], [- 40 x, 80 x, - 120 x, 160 x, - 200 x], [- 32 x, 64 x, - 96 x,
128 x, - 160 x], [- 24 x, 48 x, - 72 x, 96 x, - 120 x]], [[- 60 x, 120 x, - 180 x, 240 x, - 300 x], [- 50 x,
100 x, - 150 x, 200 x, - 250 x], [- 40 x, 80 x, - 120 x, 160 x, - 200 x], [- 30 x, 60 x, - 90 x, 120 x, -
150 x]]]], [[[[[- 18 y, 36 y, - 54 y, 72 y, - 90 y], [- 15 y, 30 y, - 45 y, 60 y, - 75 y], [- 12 y, 24 y, -
36 y, 48 y, - 60 y], [- 9 y, 18 y, - 27 y, 36 y, - 45 y]], [[- 24 y, 48 y, - 72 y, 96 y, - 120 y], [- 20 y,
40 y, - 60 y, 80 y, - 100 y], [- 16 y, 32 y, - 48 y, 64 y, - 80 y], [- 12 y, 24 y, - 36 y, 48 y, - 60 y]],
[[ - 30 y, 60 y, - 90 y, 120 y, - 150 y], [- 25 y, 50 y, - 75 y, 100 y, - 125 y], [- 20 y, 40 y, - 60 y,
80 y, - 100 y], [- 15 y, 30 y, - 45 y, 60 y, - 75 y]]], [[[- 36 y, 72 y, - 108 y, 144 y, - 180 y], [- 30 y,
60 y, - 90 y, 120 y, - 150 y], [- 24 y, 48 y, - 72 y, 96 y, - 120 y], [- 18 y, 36 y, - 54 y, 72 y, - 90 y]],
[[ - 48 y, 96 y, - 144 y, 192 y, - 240 y], [- 40 y, 80 y, - 120 y, 160 y, - 200 y], [- 32 y, 64 y, - 96 y,
128 y, - 160 y], [- 24 y, 48 y, - 72 y, 96 y, - 120 y]], [[- 60 y, 120 y, - 180 y, 240 y, - 300 y], [- 50 y,
100 y, - 150 y, 200 y, - 250 y], [- 40 y, 80 y, - 120 y, 160 y, - 200 y], [- 30 y, 60 y, - 90 y, 120 y, -
150 y]]]]]]

(%i39) tensortype(h);

(%o39) [2, 2, 3, 4, 5]

(%i40) i : b ot a$
(%i41) tensortype(i);

(%o41) [2, 2, 3, 4, 5]

(%i42) ratsimp(i - h);

(%o42) [[[[[0, 0, 0, 0, 0], [0, 0, 0, 0, 0], [0, 0, 0, 0, 0], [0, 0, 0, 0, 0]], [[0, 0, 0, 0, 0], [0, 0, 0, 0, 0], [0, 0, 0, 0, 0],
[0, 0, 0, 0, 0]], [[0, 0, 0, 0, 0], [0, 0, 0, 0, 0], [0, 0, 0, 0, 0], [0, 0, 0, 0, 0]], [[0, 0, 0, 0, 0], [0, 0, 0, 0, 0], [0, 0, 0, 0, 0],
[0, 0, 0, 0, 0]], [[0, 0, 0, 0, 0], [0, 0, 0, 0, 0], [0, 0, 0, 0, 0], [0, 0, 0, 0, 0]], [[0, 0, 0, 0, 0], [0, 0, 0, 0, 0], [0, 0, 0, 0, 0],
[0, 0, 0, 0, 0]], [[0, 0, 0, 0, 0], [0, 0, 0, 0, 0], [0, 0, 0, 0, 0], [0, 0, 0, 0, 0]], [[0, 0, 0, 0, 0], [0, 0, 0, 0, 0], [0, 0, 0, 0, 0],
[0, 0, 0, 0, 0]], [[0, 0, 0, 0, 0], [0, 0, 0, 0, 0], [0, 0, 0, 0, 0], [0, 0, 0, 0, 0]], [[0, 0, 0, 0, 0], [0, 0, 0, 0, 0], [0, 0, 0, 0, 0],
[0, 0, 0, 0, 0]], [[0, 0, 0, 0, 0], [0, 0, 0, 0, 0], [0, 0, 0, 0, 0], [0, 0, 0, 0, 0]], [[0, 0, 0, 0, 0], [0, 0, 0, 0, 0], [0, 0, 0, 0, 0],
[0, 0, 0, 0, 0]], [[0, 0, 0, 0, 0], [0, 0, 0, 0, 0], [0, 0, 0, 0, 0], [0, 0, 0, 0, 0]], [[0, 0, 0, 0, 0], [0, 0, 0, 0, 0], [0, 0, 0, 0, 0],
[0, 0, 0, 0, 0]], [[0, 0, 0, 0, 0], [0, 0, 0, 0, 0], [0, 0, 0, 0, 0], [0, 0, 0, 0, 0]], [[0, 0, 0, 0, 0], [0, 0, 0, 0, 0], [0, 0, 0, 0, 0],
[0, 0, 0, 0, 0]], [[0, 0, 0, 0, 0], [0, 0, 0, 0, 0], [0, 0, 0, 0, 0], [0, 0, 0, 0, 0]]]]]]

(%i43) tensortype(c);

(%o43) [2, 3, 4, 5, 2]

(%i44) exchtttype(c, 2, 4);

```

```
(%o44) [[[[[-18 x, -18 y], [-24 x, -24 y], [-30 x, -30 y]], [[-15 x, -15 y], [-20 x, -20 y], [-25 x, -25 y]], [[-12 x, -12 y], [-16 x, -16 y], [-20 x, -20 y]], [[-9 x, -9 y], [-12 x, -12 y], [-15 x, -15 y]]], [[36 x, 36 y], [48 x, 48 y], [60 x, 60 y]], [[30 x, 30 y], [40 x, 40 y], [50 x, 50 y]], [[24 x, 24 y], [32 x, 32 y], [40 x, 40 y]], [[18 x, 18 y], [24 x, 24 y], [30 x, 30 y]]], [[[-54 x, -54 y], [-72 x, -72 y], [-90 x, -90 y]], [[-45 x, -45 y], [-60 x, -60 y], [-75 x, -75 y]], [[-36 x, -36 y], [-48 x, -48 y], [-60 x, -60 y]], [[-27 x, -27 y], [-36 x, -36 y], [-45 x, -45 y]]], [[[72 x, 72 y], [96 x, 96 y], [120 x, 120 y]], [[60 x, 60 y], [80 x, 80 y], [100 x, 100 y]], [[48 x, 48 y], [64 x, 64 y], [80 x, 80 y]], [[36 x, 36 y], [48 x, 48 y], [60 x, 60 y]]], [[[-90 x, -90 y], [-120 x, -120 y], [-150 x, -150 y]], [[-75 x, -75 y], [-100 x, -100 y], [-125 x, -125 y]], [[-60 x, -60 y], [-80 x, -80 y], [-100 x, -100 y]], [[-45 x, -45 y], [-60 x, -60 y], [-75 x, -75 y]]]], [[[-36 x, -36 y], [-48 x, -48 y], [-60 x, -60 y]], [[-30 x, -30 y], [-40 x, -40 y], [-50 x, -50 y]], [[-24 x, -24 y], [-32 x, -32 y], [-40 x, -40 y]], [[-18 x, -18 y], [-24 x, -24 y], [-30 x, -30 y]]], [[[72 x, 72 y], [96 x, 96 y], [120 x, 120 y]], [[60 x, 60 y], [80 x, 80 y], [100 x, 100 y]], [[48 x, 48 y], [64 x, 64 y], [80 x, 80 y]], [[36 x, 36 y], [48 x, 48 y], [60 x, 60 y]]], [[[-108 x, -108 y], [-144 x, -144 y], [-180 x, -180 y]], [[-90 x, -90 y], [-120 x, -120 y], [-150 x, -150 y]], [[-72 x, -72 y], [-96 x, -96 y], [-120 x, -120 y]], [[-54 x, -54 y], [-72 x, -72 y], [-90 x, -90 y]]], [[[144 x, 144 y], [192 x, 192 y], [240 x, 240 y]], [[120 x, 120 y], [160 x, 160 y], [200 x, 200 y]], [[96 x, 96 y], [128 x, 128 y], [160 x, 160 y]], [[72 x, 72 y], [96 x, 96 y], [120 x, 120 y]]], [[[-180 x, -180 y], [-240 x, -240 y], [-300 x, -300 y]], [[-150 x, -150 y], [-200 x, -200 y], [-250 x, -250 y]], [[-120 x, -120 y], [-160 x, -160 y], [-200 x, -200 y]], [[-90 x, -90 y], [-120 x, -120 y], [-150 x, -150 y]]]]]]
```

```
(%i45) tensor(%o44);
```

```
(%o45) [2, 5, 4, 3, 2]
```

```
(%i46) zerotensor([4, 3, 2]);
```

```
(%o46) [[[0, 0], [0, 0], [0, 0]], [[0, 0], [0, 0], [0, 0]], [[0, 0], [0, 0], [0, 0]], [[0, 0], [0, 0], [0, 0]]]
```

```
(%i47) kill(ALL);
```

```
(%o0) DONE
```

```
(%i1)
```