101 Pong:

```
Terminal
~/B-MAT-100> ./101pong 1 3 5 7 9 -2 4
The velocity vector of the ball is:
(6.00, 6.00, -7.00)
At time t + 4, ball coordinates will be:
(31.00, 33.00, -30.00)
The ball won't reach the paddle.
```

```
Terminal
~/B-MAT-100> ./101pong 1.1 3 5 -7 9 2 4
The velocity vector of the ball is:
(-8.10, 6.00, -3.00)
At time t + 4, ball coordinates will be:
(-39.40, 33.00, -10.00)
The incidence angle is:
16.57 degrees
```

102 Architect:

```
Terminal
~/B-MAT-100> ./102architect 5 0 -t -1 1
Translation along vector (-1, 1)
1.00    0.00    -1.00
0.00    1.00    1.00
0.00    0.00    1.00
(5.00, 0.00) => (4.00, 1.00)
```

```
Terminal
~/B-MAT-100> ./102architect 2 2 -z -1 1
Scaling by factors -1 and 1
-1.00   0.00    0.00
0.00    1.00    0.00
0.00    0.00    1.00
(2.00, 2.00) => (-2.00, 2.00)
```

```
Terminal
~/B-MAT-100> ./102architect 1 0 -r 90
Rotation by a 90 degree angle
0.00    -1.00   0.00
1.00    0.00    0.00
0.00    0.00    1.00
(1.00, 0.00) => (0.00, 1.00)
```

```
Terminal
~/B-MAT-100> ./102architect 3 -1 -s 270
Reflection over an axis with an inclination angle of 270 degrees
-1.00   0.00    0.00
0.00    1.00    0.00
0.00    0.00    1.00
(3.00, -1.00) => (-3.00, -1.00)
```

```
Terminal
~/B-MAT-100> ./102architect 1 2 -t 2 3 -z 1 -2 -r 45 -s 30
Translation along vector (2, 3)
Scaling by factors 1 and -2
Rotation by a 45 degree angle
Reflection over an axis with an inclination angle of 30 degrees
0.97    -0.52   0.38
```

103 Cipher:

```
Terminal
~/B-MAT-100> ./103cipher "26690 21552 11810 19718 16524 13668 25322 22497 14177
28422 26097 16433 12333 11874 5824 27541 23754 14452 17180 17553 7963 26387 22047
13895 18804 14859 12033 27738 23835 15331 21487 16656 13238 21696 15978 6976 20750
23307 14093 16788 11751 8981 22339 24861 15619 21295 16524 13668 26403 23610 15190
29451 25764 16106 26394 23307 14093 3312 5106 5014" "Homer S" 1
Key matrix:
0.0     0.0     0.012
-0.004  0.012   -0.012
0.013   -0.013  0.004

Decrypted message:
Just because I don't care doesn't mean I don't understand.
```

```
Terminal
~/B-MAT-100> ./103cipher "Just because I don't care doesn't mean I don't
understand." "Homer S" 0
Key matrix:
72      111     109
101     114     32
83      0       0

Encrypted message:
26690 21552 11810 19718 16524 13668 25322 22497 14177 28422 26097 16433 12333
11874 5824 27541 23754 14452 17180 17553 7963 26387 22047 13895 18804 14859 12033
27738 23835 15331 21487 16656 13238 21696 15978 6976 20750 23307 14093 16788 11751
8981 22339 24861 15619 21295 16524 13668 26403 23610 15190 29451 25764 16106 26394
23307 14093 3312 5106 5014
```

104 Intersection:

```
Terminal
~/B-MAT-100> ./104intersection 1 0 0 2 1 1 0 1
Sphere of radius 1
Line passing through the point (0, 0, 2) and parallel to the vector (1, 1, 0)
No intersection point.
```

```
Terminal
~/B-MAT-100> ./104intersection 1 4 0 3 0 0 -2 4
Sphere of radius 4
Line passing through the point (4, 0, 3) and parallel to the vector (0, 0, -2)
1 intersection point:
(4.000, 0.000, 0.000)
```

```
Terminal
~/B-MAT-100> ./104intersection 2 0 0 2 1 1 0 1
Cylinder of radius 1
Line passing through the point (0, 0, 2) and parallel to the vector (1, 1, 0)
2 intersection points:
(0.707, 0.707, 2.000)
(-0.707, -0.707, 2.000)
```

```
Terminal
~/B-MAT-100> ./104intersection 3 -1 -1 -1 1 1 5 30
Cone with a 30 degree angle
Line passing through the point (-1, -1, -1) and parallel to the vector (1, 1, 5)
2 intersection points:
(-1.568, -1.568, -3.842)
(-0.537, -0.537, 1.315)
```

```
Terminal
~/B-MAT-100> ./104intersection 2 1 0 0 0 0 1 1
Cylinder of radius 1
Line passing through the point (1, 0, 0) and parallel to the vector (0, 0, 1)
There is an infinite number of intersection points.
```

105 Torus:

```
Terminal
~/B-MAT-100> ./105torus 1 -1 0 6 -5 1 6
x = 0.5
x = 0.75
x = 0.625
x = 0.5625
x = 0.53125
x = 0.515625
x = 0.523438
x = 0.519531
x = 0.521484
x = 0.522461
x = 0.522949
x = 0.522705
x = 0.522827
x = 0.522766
x = 0.522736
x = 0.522751
x = 0.522743
x = 0.522739
x = 0.522741
x = 0.522740
```

```
Terminal
~/B-MAT-100> ./105torus 2 -1 0 6 -5 1 12
x = 0.5
x = 0.522727272727
x = 0.522740003514
x = 0.522740003526
```

```
Terminal
~/B-MAT-100> ./105torus 3 -1 0 6 -5 1 8
x = 0.5
x = 0.52941176
x = 0.52274853
x = 0.52274000
x = 0.52274000
```

106 Bombyx:

```
Terminal
~/B-MAT-200> ./106bombyx 10 3.3 > data
~/B-MAT-200> head data
1 10.00
2 32.67
3 104.29
4 308.26
5 703.68
6 688.10
7 708.24
8 681.89
9 715.82
10 671.29
~/B-MAT-200> tail data
91 823.60
92 479.43
93 823.60
94 479.43
95 823.60
96 479.43
97 823.60
98 479.43
99 823.60
100 479.43
```

107 Transfer:

```
Terminal
~/B-MAT-200> ./107transfer -h
USAGE
    ./107transfer [num den]*

DESCRIPTION
    num     polynomial numerator defined by its coefficients
    den     polynomial denominator defined by its coefficients
```

EXAMPLES

```
Terminal
~/B-MAT-200> ./107transfer "0*1*2*3*4" "1" > file
~/B-MAT-200> head -n 12 file
0.000 -> 0.00000
0.001 -> 0.00100
0.002 -> 0.00201
0.003 -> 0.00302
0.004 -> 0.00403
0.005 -> 0.00505
0.006 -> 0.00607
0.007 -> 0.00710
0.008 -> 0.00813
0.009 -> 0.00916
0.010 -> 0.01020
0.011 -> 0.01125
~/B-MAT-200> tail file
0.991 -> 9.73282
0.992 -> 9.76223
0.993 -> 9.79171
0.994 -> 9.82126
0.995 -> 9.85087
0.996 -> 9.88056
0.997 -> 9.91031
0.998 -> 9.94014
```