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100: # GENERATE RANDOM NUMBERS;
105: # GENERATE SIN COS WAVE;
107: # FFT ANALYSIS;
110: # TEST_RAND_FFT_03.TXT;
120: # CI-2, V.1.1.0, PERSEUS-8;
130: # JAN.24,2022;
140: # MITSURU YAMADA;
150: #####;
180: # ---- CONSTANT ----;
190: M=256;
195: K=30;
197: J=35;
200: N=0;
210: A=3;
220: H=262144;
225: P=6.28319;
230: N)X=6.71630E4;
235: # -- GENERATE RANDOM NUMBERS + SIN COS WAVE --
240: B=A N)X*;
250: N 1+)X=B B H/)I H*-;
260: N)Y=N)X H/ 0.5- N P K** M/)S 0.5*+ N P J** M/)C 0.5*+;
261: N)Z=0;
262: N;;
265: N)Y
270: N=N 1+;
280: N M?< 240!
990: # ----- FFT ANALYSIS -----
1010: P=3.14159;
1020: L=M 1-;
1030: D=M 2/;
1040: S=M)L 2)L/ 1E-4+)I;
1050: J=D;
1060: I=1;
1070: I J?>= 1140!
1080: R=J)Y;
1090: T=J)Z;
1100: J)Y=I)Y;
1110: J)Z=I)Z;
1120: I)Y=R;
1130: I)Z=T;
1140: K=D;
1150: K J?> 1190!
1160: J=J K-;
1170: K=K 2/;
1180: 1150!
1190: J=J K+;
1195: I=I 1+;
1200: I M?<= 1070!
1300: # -----;
1310: A=1;
1315: # --- EXPONENTIATION ---;
1320: C=2;
1330: B=1;
1340: K=1;
1350: B=B C*;
1360: K=K 1+;
1370: K A?<= 1350!
1375: # -----;
1380: C=B 2/;
1390: R=1;
1400: U=0;
1410: F=P C/)C;
1420: G=P C/)S -1*;
1430: J=1;
1440: H=J 1-;
1450: I=H;
1460: Q=I C+;
1470: X=Q)Y R* Q)Z U*-;
1480: V=Q)Y U* Q)Z R*+;
1490: Q)Y=I)Y X-;
1500: Q)Z=I)Z V-;
1510: I)Y=I)Y X+;
1520: I)Z=I)Z V+;
1530: I=I B+;
1540: I L?<= 1460!
1550: X=R;
1560: R=X F* U G*-;
1570: U=X G* U F*+;
1580: J=J 1+;
1590: J C?<= 1440!
1600: A=A 1+;
1610: A S?<= 1320!
2000: # -- POWER SPECTRUM --
2010: K=0;
2020: K)Z= K)Y K)Y* K)Z K)Z*+)Q;
2030: K;;
2035: K)Z
2040: K=K 1+;
2050: K M?< 2020!
>

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>!
-- GENERATE RANDOM NUMBERS + SIN COS WAVE --
0      2.56211E-1
1.00000E0 9.30985E-1
2.00000E0 2.30088E-1
3.00000E0 3.96752E-1
4.00000E0 -1.28197E-1
5.00000E0 -7.01505E-1
6.00000E0 9.84000E-3
7.00000E0 -1.46478E-1
8.00000E0 6.95324E-1
9.00000E0 6.42435E-1
1.00000E1 3.43530E-1
1.10000E1 -2.99765E-1
1.20000E1 1.05795E-1
1.30000E1 4.47693E-1
1.40000E1 3.48993E-1
1.50000E1 -1.04672E-1
1.60000E1 -4.02350E-1
1.70000E1 3.02690E-2
1.80000E1 -3.29018E-1
1.90000E1 -3.97748E-1
2.00000E1 -8.38645E-2
2.10000E1 1.14377E-1
2.20000E1 2.07948E-1
2.30000E1 -3.30522E-1
2.40000E1 -6.14720E-2
2.50000E1 -1.54771E-1
2.60000E1 1.56673E-1
2.70000E1 6.95763E-1
2.80000E1 1.06639E0
2.90000E1 8.06451E-1
3.00000E1 4.14788E-1
3.10000E1 -1.47012E-1
3.20000E1 -1.29323E0
3.30000E1 -1.18786E0
3.40000E1 -3.03066E-1
3.50000E1 5.38492E-1
3.60000E1 1.32428E0
3.70000E1 1.07391E0
3.80000E1 -1.50813E-1
3.90000E1 -8.53042E-1
4.00000E1 -1.13039E0
4.10000E1 -3.98809E-1
4.20000E1 1.38017E-1
4.30000E1 6.77855E-1
4.40000E1 4.95557E-1
4.50000E1 5.28944E-1
4.60000E1 4.35272E-1
4.70000E1 -7.52019E-1
4.80000E1 -6.57728E-1
4.90000E1 -1.82712E-1
5.00000E1 2.91059E-1
5.10000E1 6.80504E-1
5.20000E1 4.47618E-1
5.30000E1 8.47020E-1
5.40000E1 1.19613E-1
5.50000E1 -1.80216E-1
5.60000E1 -2.62290E-2
5.70000E1 1.00090E-2
5.80000E1 -4.07020E-2
5.90000E1 1.57119E-1
6.00000E1 1.13760E-1
6.10000E1 -2.52917E-1
6.20000E1 -1.57885E-1
6.30000E1 -5.25423E-1
6.40000E1 -4.47651E-1
6.50000E1 -3.00739E-1
6.60000E1 -3.41000E-2
6.70000E1 -2.27358E-1
6.80000E1 -5.22251E-1
6.90000E1 -3.85610E-2
7.00000E1 5.11087E-1
7.10000E1 7.72254E-1
7.20000E1 8.29712E-1
7.30000E1 4.09457E-1
7.40000E1 1.74444E-1
7.50000E1 -7.61911E-1
7.60000E1 -4.57608E-1
7.70000E1 -7.98890E-1
7.80000E1 -9.84500E-3
7.90000E1 2.37483E-1
8.00000E1 5.58673E-1
8.10000E1 7.00833E-1
8.20000E1 -5.06695E-1
8.30000E1 -7.14590E-1
8.40000E1 -7.08659E-1
8.50000E1 -8.69410E-1
8.60000E1 1.02284E-1
8.70000E1 3.90194E-1
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8.80000E1 5.27412E-1
8.90000E1 1.85429E-1
9.00000E1 -1.37336E-1
9.10000E1 -1.36587E0
9.20000E1 -1.34186E0
9.30000E1 -6.39051E-1
9.40000E1 6.50826E-1
9.50000E1 7.79759E-1
9.60000E1 5.84644E-1
9.70000E1 5.27193E-1
9.80000E1 -7.71321E-1
9.90000E1 -1.04070E0
1.00000E2 -4.90133E-1
1.01000E2 -5.41544E-1
1.02000E2 4.46667E-1
1.03000E2 1.01101E0
1.04000E2 6.45868E-1
1.05000E2 4.22756E-1
1.06000E2 -4.84035E-1
1.07000E2 -1.26636E-1
1.08000E2 -3.47825E-1
1.09000E2 -2.94550E-2
1.10000E2 3.36386E-1
1.11000E2 -2.45375E-1
1.12000E2 -3.21733E-1
1.13000E2 -4.26838E-1
1.14000E2 -3.96388E-1
1.15000E2 -7.44590E-2
1.16000E2 -1.47316E-1
1.17000E2 4.55284E-1
1.18000E2 2.16979E-1
1.19000E2 -2.64314E-1
1.20000E2 -3.29061E-1
1.21000E2 -3.44792E-1
1.22000E2 3.19731E-1
1.23000E2 6.24556E-1
1.24000E2 8.75755E-1
1.25000E2 5.05740E-1
1.26000E2 3.10960E-2
1.27000E2 -2.96192E-1
1.28000E2 -4.01697E-1
1.29000E2 3.03453E-1
1.30000E2 4.53093E-1
1.31000E2 4.69954E-1
1.32000E2 5.13950E-1
1.33000E2 -2.39961E-1
1.34000E2 -2.47921E-1
1.35000E2 -6.00317E-1
1.36000E2 -6.06787E-1
1.37000E2 1.08355E-1
1.38000E2 7.78919E-1
1.39000E2 9.90921E-1
1.40000E2 6.12834E-1
1.41000E2 -1.04438E-1
1.42000E2 -6.51424E-1
1.43000E2 -4.81941E-1
1.44000E2 -6.79280E-2
1.45000E2 6.30553E-1
1.46000E2 1.09228E0
1.47000E2 7.73409E-1
1.48000E2 7.44944E-2
1.49000E2 -3.93710E-1
1.50000E2 -2.46373E-1
1.51000E2 -3.11076E-1
1.52000E2 3.80335E-2
1.53000E2 4.28793E-1
1.54000E2 2.37264E-1
1.55000E2 4.71274E-1
1.56000E2 -1.57546E-1
1.57000E2 -4.25599E-1
1.58000E2 -1.59556E-1
1.59000E2 -5.23151E-1
1.60000E2 -4.93886E-1
1.61000E2 8.50080E-2
1.62000E2 1.18573E-1
1.63000E2 -2.02571E-1
1.64000E2 -1.22293E-1
1.65000E2 4.47605E-1
1.66000E2 4.32711E-1
1.67000E2 3.99736E-1
1.68000E2 1.29693E-1
1.69000E2 2.27092E-1
1.70000E2 -2.99359E-1
1.71000E2 -5.05417E-1
1.72000E2 1.23616E-1
1.73000E2 -1.77318E-1
1.74000E2 2.85937E-1
1.75000E2 -3.65330E-2
1.76000E2 -2.67709E-1
1.77000E2 -4.69166E-1

1.78000E2 -1.02211E0
1.79000E2 -7.00660E-1
1.80000E2 -5.14083E-1
1.81000E2 2.54729E-1
1.82000E2 1.15570E0
1.83000E2 6.96339E-1
1.84000E2 1.82710E-1
1.85000E2 -2.94505E-1
1.86000E2 -1.05609E0
1.87000E2 -1.09042E0
1.88000E2 -1.77570E-1
1.89000E2 2.77191E-1
1.90000E2 8.13721E-1
1.91000E2 1.17799E0
1.92000E2 3.92081E-1
1.93000E2 -5.33884E-1
1.94000E2 -1.44699E0
1.95000E2 -1.03240E0
1.96000E2 -4.45910E-2
1.97000E2 4.33300E-1
1.98000E2 1.08481E0
1.99000E2 1.04738E0
2.00000E2 3.01954E-1
2.01000E2 -4.95749E-1
2.02000E2 -1.30220E0
2.03000E2 -9.45027E-1
2.04000E2 -3.10382E-1
2.05000E2 3.05678E-1
2.06000E2 8.61160E-1
2.07000E2 -4.95600E-3
2.08000E2 -1.49101E-1
2.09000E2 -5.42442E-1
2.10000E2 -7.97868E-1
2.11000E2 -2.84319E-1
2.12000E2 -1.52306E-1
2.13000E2 5.36461E-1
2.14000E2 9.75850E-2
2.15000E2 -2.63758E-1
2.16000E2 -4.91740E-2
2.17000E2 -9.41850E-2
2.18000E2 -1.61691E-1
2.19000E2 4.83190E-1
2.20000E2 2.87650E-1
2.21000E2 -1.76589E-1
2.22000E2 -2.12541E-1
2.23000E2 -1.98860E-2
2.24000E2 4.70151E-1
2.25000E2 3.76676E-1
2.26000E2 3.58053E-1
2.27000E2 -8.71710E-2
2.28000E2 -8.49390E-2
2.29000E2 -1.09595E0
2.30000E2 -1.07479E0
2.31000E2 -5.97437E-1
2.32000E2 2.32140E-1
2.33000E2 3.76974E-1
2.34000E2 5.27505E-1
2.35000E2 6.01742E-1
2.36000E2 -3.24895E-1
2.37000E2 -4.78656E-1
2.38000E2 -5.25020E-1
2.39000E2 -3.70218E-1
2.40000E2 1.03022E0
2.41000E2 1.42368E0
2.42000E2 1.16104E0
2.43000E2 1.97877E-1
2.44000E2 -4.72729E-1
2.45000E2 -6.13015E-1
2.46000E2 -6.58655E-1
2.47000E2 2.44813E-1
2.48000E2 6.58365E-1
2.49000E2 1.08193E0
2.50000E2 1.13444E0
2.51000E2 3.83086E-1
2.52000E2 -5.84528E-1
2.53000E2 -8.44752E-1
2.54000E2 -6.31741E-1
2.55000E2 -1.93953E-1
----- FFT ANALYSIS -----
-- POWER SPECTRUM --
0 1.84375E0
1.00000E0 3.90097E0
2.00000E0 1.19884E1
3.00000E0 6.22870E0
4.00000E0 5.24405E0
5.00000E0 3.34453E0
6.00000E0 1.41941E0
7.00000E0 1.72162E0
8.00000E0 9.72590E-2
9.00000E0 7.66225E0

1.0000E1 3.22330E0
1.1000E1 1.62766E1
1.2000E1 4.49408E0
1.3000E1 1.07008E1
1.4000E1 5.03445E0
1.5000E1 1.77204E0
1.6000E1 9.31495E0
1.7000E1 5.64850E0
1.8000E1 1.09064E1
1.9000E1 8.94535E-1
2.0000E1 4.07116E0
2.1000E1 1.27234E0
2.2000E1 8.44260E0
2.3000E1 7.99670E0
2.4000E1 3.43595E0
2.5000E1 3.90184E0
2.6000E1 4.04373E0
2.7000E1 3.95425E0
2.8000E1 7.73200E0
2.9000E1 9.59775E-1
3.0000E1 5.78970E1
3.1000E1 1.27863E1
3.2000E1 6.87835E0
3.3000E1 8.47735E0
3.4000E1 6.11790E0
3.5000E1 6.65180E1
3.6000E1 5.94230E0
3.7000E1 8.48050E0
3.8000E1 1.02751E1
3.9000E1 5.28060E0
4.0000E1 1.67824E0
4.1000E1 1.32573E0
4.2000E1 4.16809E0
4.3000E1 7.98935E-1
4.4000E1 5.16405E0
4.5000E1 6.20340E0
4.6000E1 3.58813E0
4.7000E1 3.97855E0
4.8000E1 1.74015E0
4.9000E1 5.11675E0
5.0000E1 8.65055E-1
5.1000E1 2.72391E0
5.2000E1 1.71109E0
5.3000E1 6.53090E0
5.4000E1 4.25909E0
5.5000E1 3.69200E0
5.6000E1 6.42725E0
5.7000E1 5.43320E0
5.8000E1 1.65664E0
5.9000E1 9.35555E-1
6.0000E1 8.39780E-1
6.1000E1 3.46428E-1
6.2000E1 3.37237E0
6.3000E1 5.79485E0
6.4000E1 5.00800E0
6.5000E1 2.34028E0
6.6000E1 4.09162E0
6.7000E1 3.09477E0
6.8000E1 4.08624E-1
6.9000E1 3.83947E0
7.0000E1 3.39608E0
7.1000E1 2.64011E0
7.2000E1 2.52826E0
7.3000E1 5.01000E0
7.4000E1 1.46547E0
7.5000E1 6.35100E0
7.6000E1 3.93114E0
7.7000E1 2.72434E0
7.8000E1 5.23300E0
7.9000E1 1.70521E0
8.0000E1 3.47744E0
8.1000E1 2.60840E0
8.2000E1 4.52674E0
8.3000E1 4.03074E0
8.4000E1 3.44113E0
8.5000E1 2.21981E0
8.6000E1 3.37139E0
8.7000E1 2.12959E0
8.8000E1 3.59567E0
8.9000E1 1.01357E0
9.0000E1 2.02380E0
9.1000E1 3.16548E0
9.2000E1 1.72275E0
9.3000E1 4.29611E0
9.4000E1 4.03782E-1
9.5000E1 1.81505E0
9.6000E1 8.33075E0
9.7000E1 3.44543E0
9.8000E1 2.00077E0
9.9000E1 4.98168E0

1.0000E2 2.24626E0
1.0100E2 4.85300E0
1.0200E2 2.73871E0
1.0300E2 1.41506E0
1.0400E2 6.04775E0
1.0500E2 1.85228E0
1.0600E2 6.28815E0
1.0700E2 4.65312E0
1.0800E2 6.21100E0
1.0900E2 4.81036E0
1.1000E2 2.92491E0
1.1100E2 1.31265E0
1.1200E2 2.53463E0
1.1300E2 2.61882E0
1.1400E2 4.07395E0
1.1500E2 2.90776E0
1.1600E2 2.55465E0
1.1700E2 4.79004E-1
1.1800E2 1.28111E0
1.1900E2 2.33619E0
1.2000E2 1.35283E0
1.2100E2 1.98401E0
1.2200E2 1.34143E0
1.2300E2 3.82870E0
1.2400E2 2.43292E0
1.2500E2 1.84323E0
1.2600E2 1.56450E0
1.2700E2 1.03901E0
1.2800E2 2.07889E0
1.2900E2 1.03798E0
1.3000E2 1.55820E0
1.3100E2 1.84147E0
1.3200E2 2.42980E0
1.3300E2 3.82345E0
1.3400E2 1.33904E0
1.3500E2 1.98063E0
1.3600E2 1.35208E0
1.3700E2 2.32881E0
1.3800E2 1.28240E0
1.3900E2 4.70001E-1
1.4000E2 2.55484E0
1.4100E2 2.91194E0
1.4200E2 4.06875E0
1.4300E2 2.61680E0
1.4400E2 2.53738E0
1.4500E2 1.31437E0
1.4600E2 2.91645E0
1.4700E2 4.80705E0
1.4800E2 6.20565E0
1.4900E2 4.65078E0
1.5000E2 6.28030E0
1.5100E2 1.84996E0
1.5200E2 6.04485E0
1.5300E2 1.41448E0
1.5400E2 2.73905E0
1.5500E2 4.84935E0
1.5600E2 2.24229E0
1.5700E2 4.97819E0
1.5800E2 2.01527E0
1.5900E2 3.44633E0
1.6000E2 8.32740E0
1.6100E2 1.81115E0
1.6200E2 4.04163E-1
1.6300E2 4.28124E0
1.6400E2 1.72147E0
1.6500E2 3.16663E0
1.6600E2 2.02038E0
1.6700E2 1.01224E0
1.6800E2 3.59382E0
1.6900E2 2.12825E0
1.7000E2 3.37198E0
1.7100E2 2.21895E0
1.7200E2 3.44078E0
1.7300E2 4.02911E0
1.7400E2 4.52486E0
1.7500E2 2.60981E0
1.7600E2 3.47761E0
1.7700E2 1.70578E0
1.7800E2 5.23290E0
1.7900E2 2.72626E0
1.8000E2 3.93195E0
1.8100E2 6.35085E0
1.8200E2 1.46496E0
1.8300E2 5.01000E0
1.8400E2 2.52926E0
1.8500E2 2.64024E0
1.8600E2 3.39716E0
1.8700E2 3.84183E0
1.8800E2 4.07710E-1
1.8900E2 3.09369E0

1.9000E2 4.09323E0
1.9100E2 2.34054E0
1.9200E2 5.00830E0
1.9300E2 5.79220E0
1.9400E2 3.37391E0
1.9500E2 3.46008E-1
1.9600E2 8.38880E-1
1.9700E2 9.36385E-1
1.9800E2 1.65652E0
1.9900E2 5.43210E0
2.0000E2 6.42625E0
2.0100E2 3.69029E0
2.0200E2 4.25774E0
2.0300E2 6.53045E0
2.0400E2 1.70982E0
2.0500E2 2.72394E0
2.0600E2 8.66190E-1
2.0700E2 5.11645E0
2.0800E2 1.74101E0
2.0900E2 3.97824E0
2.1000E2 3.59037E0
2.1100E2 6.20490E0
2.1200E2 5.16490E0
2.1300E2 7.98950E-1
2.1400E2 4.16834E0
2.1500E2 1.32660E0
2.1600E2 1.67829E0
2.1700E2 5.28265E0
2.1800E2 1.02806E1
2.1900E2 8.48380E0
2.2000E2 5.94455E0
2.2100E2 6.65515E1
2.2200E2 6.12005E0
2.2300E2 8.48315E0
2.2400E2 6.88035E0
2.2500E2 1.27883E1
2.2600E2 5.79115E1
2.2700E2 9.57355E-1
2.2800E2 7.73545E0
2.2900E2 3.95790E0
2.3000E2 4.04471E0
2.3100E2 3.90430E0
2.3200E2 3.43773E0
2.3300E2 8.00115E0
2.3400E2 8.44980E0
2.3500E2 1.27502E0
2.3600E2 4.07683E0
2.3700E2 8.97095E-1
2.3800E2 1.09155E1
2.3900E2 5.65245E0
2.4000E2 9.32090E0
2.4100E2 1.77515E0
2.4200E2 5.04245E0
2.4300E2 1.07072E1
2.4400E2 4.49679E0
2.4500E2 1.62903E1
2.4600E2 3.22583E0
2.4700E2 7.67085E0
2.4800E2 9.74000E-2
2.4900E2 1.72516E0
2.5000E2 1.42190E0
2.5100E2 3.34919E0
2.5200E2 5.25070E0
2.5300E2 6.23410E0
2.5400E2 1.20000E1
2.5500E2 3.90335E0
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