Homework#7

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#0

- 11 * 11 Symmetric Matrix를 Gaussian distribution을 이용해서 Random Generate한다.
- NR in C의 `jacobi()`를 이용해서 `Eigen values`와 `Eigen vectors`를 구한다.
- NR in C의 `eigsrt()`를 이용해서 내림차순으로 `Eigen values`와 `Eigen vectors`를 정렬한다.

#1

- mean은 0.0으로, standard deviation은 1.0으로 하는 random number를 generate해서 matrix A에 symmetry하게 넣어준다.

```
for (int i = 0; i < n; ++i) {
      for (int j = i; j < n; ++j) {
          A[i][j] = A[j][i] = gasdev(idum) * s + m;
      }
  }
```

- `jacobi()`와 `eigsrt()`를 사용해서 결과값을 만든다.

```
jacobi(A, d, v, nroot);
eigsrt(d, v);
```

result

```
Random Symmetric Matrix A (mean = 0.0, standard deviation = 1.0)
-0.836854 -0.17228 0.187117 1.61544 -0.176774 0.653145 -0.546364 0.194146 0.925709 1.20432 1.53055
-0.17228 -1.35556 0.0514889 1.02018 -1.22616 0.708497 0.871673 -0.789721 0.332079 0.205603 -0.169367
0.187117 0.0514889 -0.318417 -0.295643 0.522291 -2.23105 0.258274 -0.0877757 -1.64685 0.286812 0.299986
1.61544 1.02018 -0.295643 1.10391 0.742706 -0.157581 -0.597687 0.659809 -0.0328136 1.16512 -1.048
-0.176774 -1.22616 0.522291 0.742706 0.817815 -1.40729 0.519206 -0.733439 0.325304 -0.0428672 -0.871454
0.653145 0.708497 -2.23105 -0.157581 -1.40729 0.77157 0.00988832 -0.894773 -0.649426 -0.00869429 1.87727
-0.546364 0.871673 0.258274 -0.597687 0.519206 0.00988832 -2.47856 -1.68368 -0.764296 0.145749 0.221329
0.194146 -0.789721 -0.0877757 0.659809 -0.733439 -0.894773 -1.68368 2.3968 1.91128 1.69614 0.808025
0.925709 0.332079 -1.64685 -0.0328136 0.325304 -0.649426 -0.764296 1.91128 2.78748 0.027507 0.104824
1.20432 0.205603 0.286812 1.16512 -0.0428672 -0.00869429 0.145749 1.69614 0.027507 1.78011 0.297616
1.53055 -0.169367 0.299986 -1.048 -0.871454 1.87727 0.221329 0.808025 0.104824 0.297616 0.468358

Eigen vectors
0.241491 0.138409 0.240868 -0.152464 -0.38536 0.131727 -0.319714 0.448597 0.0304595 0.597806 -0.11684
-0.0261366 0.137862 0.0981525 -0.253535 0.240011 -0.379708 -0.344895 -0.504186 0.164187 0.197645 -0.515205
-0.125355 -0.293193 0.258484 0.375979 -0.15832 -0.11094 -0.480216 -0.0695503 0.548764 -0.139125 0.311182
0.229898 -0.166492 0.421607 -0.562792 0.151086 0.363455 -0.242104 -0.159574 -0.181697 -0.302455 0.247876
-0.0696915 -0.459683 -0.0241856 -0.201905 -0.576759 0.200852 0.367357 -0.371372 0.189743 0.0981271 -0.225813
-0.0361727 0.653004 0.0708147 -0.20486 -0.0321533 0.168699 0.293656 -0.145199 0.556107 0.0173283 0.280944
-0.201369 0.016222 0.0598938 -0.0470842 -0.132901 -0.325363 0.0252425 -0.351513 -0.388057 0.441775 0.599923
0.629796 -0.0942036 -0.0210898 0.423278 0.291244 0.294386 0.103062 -0.343847 0.05307 0.32885 0.0598081
0.528625 -0.0331595 -0.590772 -0.28313 -0.223378 -0.343547 -0.170954 0.016988 0.129213 -0.177859 0.210988
0.365916 -0.0342988 0.567125 0.0482462 -0.0692665 -0.551016 0.428565 0.138244 0.0132739 -0.164421 -0.0506342
0.125442 0.446115 0.0866452 0.328292 -0.505108 0.105325 -0.210408 -0.306699 -0.349893 -0.347599 -0.148827

Eigen values
6.18389 4.53741 3.29395 2.35641 0.927964 0.0815412 -0.0466776 -1.67286 -3.03828 -3.55833 -3.92837
```