

Dobbs3

```
A=[-2i -7 5 6 5 4 4 -6;  
    10 3 1 3 -4 7 6 1;  
    -2 6 -4 7 10 -2 0 7;  
    -10 5 -1 7 9 7 -8 -8;  
    -10 5 -10 -5 4 -7 1 -1;  
    -5 -6 -2 -1 8 2 9 -7;  
    -6 6 -10 -5 10 0 9 -10;  
    7 9 0 -1 9 -8 -7 -3];
```

```
lambda_eig = eig(A)
```

```
lambda_eig = 8x1 complex  
    2.055833283160151 -19.926480062143405i  
    1.762944471311712 +18.477406870072905i  
 -11.457395437017206 + 0.071340875162048i  
    13.797208108593232 - 0.020493429752429i  
    6.133137805318221 + 6.930246373311412i  
    5.768352246333247 - 5.447748040309100i  
    0.247865604636587 - 4.012975332108618i  
 -0.307946082335923 + 1.928702745767201i
```

```
% generate a random unit vector  
v=randn(1,8);  
v=(v./norm(v))';  
power_iteration(A,v);
```

```
lamb =  
    -3.644337040195029 - 0.328693617143409i  
lamb =  
    5.762052517844499 - 1.080645550863940i  
lamb =  
    6.118525054437988 - 1.840742994739468i  
lamb =  
    6.711475979015106 - 2.833447145258694i  
lamb =  
   -0.058624309288082 - 3.940646814902091i  
lamb =  
    4.360610468583784 - 6.844786532436312i  
lamb =  
    1.179185923091639 - 6.763996036881853i  
lamb =  
    3.510177977369319 - 9.901085572040605i  
lamb =  
    1.555724896438373 - 8.754701360367649i  
lamb =  
    1.607801706062303 -12.925122940115138i  
lamb =  
    2.632064646940469 -10.873587023155945i
```

$\lambda = 0.918043869627808 - 14.566945075398525i$
 $\lambda = 3.286914359294559 - 12.643013873261436i$
 $\lambda = 0.168672798464373 - 15.751004916684430i$
 $\lambda = 3.736012681758896 - 14.521850697500016i$
 $\lambda = 0.123751484417042 - 16.360920842709042i$
 $\lambda = 3.845677121756435 - 16.156572659929523i$
 $\lambda = 0.299883321111992 - 16.734054738700770i$
 $\lambda = 3.640937979751659 - 17.619681257731635i$
 $\lambda = 0.726174946674103 - 17.020567333709927i$
 $\lambda = 3.220699760801689 - 18.723912175621336i$
 $\lambda = 1.216490723829523 - 17.310044919430602i$
 $\lambda = 2.688474350631783 - 19.473726812576416i$
 $\lambda = 1.707378321494764 - 17.656309738012851i$
 $\lambda = 2.181629895464055 - 19.867516253116261i$
 $\lambda = 2.124671030437586 - 18.056425505382382i$
 $\lambda = 1.780917855348202 - 19.990178330530235i$
 $\lambda = 2.431743342852036 - 18.495799723956367i$
 $\lambda = 1.532728167600006 - 19.936205158611564i$
 $\lambda = 2.609471964452434 - 18.937980946591026i$
 $\lambda = 1.433771678214972 - 19.799278691383179i$
 $\lambda = 2.660840375902050 - 19.346195147053713i$
 $\lambda = 1.457864984194561 - 19.649739194556407i$
 $\lambda = 2.606617425674356 - 19.685848299619664i$
 $\lambda = 1.565625981422657 - 19.532217277412755i$
 $\lambda = 2.479867400278423 - 19.935136809949597i$
 $\lambda =$

1.717691759556108 -19.468522294161168i
 lamb =
 2.318597321341008 -20.087249467264527i
 lamb =
 1.879652186290393 -19.462943753326019i
 lamb =
 2.157601128373926 -20.150588954973568i
 lamb =
 2.025380799066013 -19.508052170030787i
 lamb =
 2.022883701857061 -20.144302379198948i
 lamb =
 2.137829208209936 -19.589401783410672i
 lamb =
 1.929020993171183 -20.092623099035585i
 lamb =
 2.208917889709653 -19.689687748063172i
 lamb =
 1.879809224230088 -20.019424855727905i
 lamb =
 2.238483643667273 -19.792033736001748i
 lamb =
 1.870763052257085 -19.944480883186834i
 lamb =
 2.232538047617157 -19.882563367677001i
 lamb =
 1.892362083074505 -19.881628889706409i
 lamb =
 2.201011869906426 -19.951988638601879i
 lamb =
 1.933050353009288 -19.838515446614352i
 lamb =
 2.155332929078471 -19.996162183303831i
 lamb =
 1.981580748555587 -19.817365182299881i
 lamb =
 2.106257773310720 -20.015631188815036i
 lamb =
 2.028575033163056 -19.816274151024299i
 lamb =
 2.062300828840018 -20.014469293979616i
 lamb =
 2.067367724952587 -19.830676661313916i
 lamb =
 2.028932205913965 -19.998765197980951i
 lamb =
 2.094250759008188 -19.854753756661271i
 lamb =
 2.008504486228689 -19.975146507904242i
 lamb =
 2.108253302066761 -19.882637597404099i

lamb =
 2.000723749062942 -19.949606454542575i
 lamb =
 2.110594027145760 -19.909316541297557i
 lamb =
 2.003421456175512 -19.926757778248586i
 lamb =
 2.103949218343199 -19.931191904724592i
 lamb =
 2.013404984585962 -19.909513798628726i
 lamb =
 2.091679007320424 -19.946284827755576i
 lamb =
 2.027225055419420 -19.899119405485905i
 lamb =
 2.077136836957521 -19.954140487328907i
 lamb =
 2.041766919198906 -19.895422866412360i
 lamb =
 2.063151500046720 -19.955515046278673i
 lamb =
 2.054629370229062 -19.897278623190793i
 lamb =
 2.051723773410682 -19.951948998397434i
 lamb =
 2.064296621316972 -19.902986909736025i
 lamb =
 2.043933012683568 -19.945325835745695i
 lamb =
 2.070134307258616 -19.910698125589402i
 lamb =
 2.040013850858753 -19.937492325845774i
 lamb =
 2.072255806768768 -19.918733644645364i
 lamb =
 2.039544712320793 -19.929985448704468i
 lamb =
 2.071311046842433 -19.925797928727100i
 lamb =
 2.041687454547918 -19.923880429917730i
 lamb =
 2.068248345439691 -19.931077936143502i
 lamb =
 2.045426520494348 -19.919750386180024i
 lamb =
 2.064091878825649 -19.934243116863168i
 lamb =
 2.049770921959800 -19.917713177900112i
 lamb =
 2.059764888042412 -19.935371096138308i
 lamb =

2.053898528785731 -19.917534635364149i
 lamb =
 2.055974330607341 -19.934829540422381i
 lamb =
 2.057236512936419 -19.918757492636789i
 lamb =
 2.053159072396136 -19.933143964503678i
 lamb =
 2.059482889328482 -19.920829926861455i
 lamb =
 2.051493086062958 -19.930875813331447i
 lamb =
 2.060581418661702 -19.923214596129487i
 lamb =
 2.050928629891598 -19.928527116399223i
 lamb =
 2.060665798774233 -19.925466909819040i
 lamb =
 2.051262081111970 -19.926479455688298i
 lamb =
 2.059989532017999 -19.927278716343842i
 lamb =
 2.052206224940979 -19.924967524493102i
 lamb =
 2.058855820970233 -19.928489745510738i
 lamb =
 2.053456184374085 -19.924082116602374i
 lamb =
 2.057558179114122 -19.929073428532316i
 lamb =
 2.054740613515330 -19.923794261426444i
 lamb =
 2.056338066376172 -19.929105936701056i
 lamb =
 2.055854271305090 -19.923991226082599i
 lamb =
 2.055361610717999 -19.928727578642899i
 lamb =
 2.056671947305005 -19.924515782348941i
 lamb =
 2.054713992563761 -19.928104496988674i
 lamb =
 2.057146534851048 -19.925201919085023i
 lamb =
 2.054407710701284 -19.927396476536781i
 lamb =
 2.057295705919945 -19.925902509428212i
 lamb =
 2.054399800964815 -19.926734198720943i
 lamb =
 2.057182201279458 -19.926506833200165i

$\lambda = 2.054613003884689 - 19.926206938192998i$
 $\lambda = 2.056892410589682 - 19.926947941233742i$
 $\lambda = 2.054956597682130 - 19.925859828523166i$
 $\lambda = 2.056516959317129 - 19.927201397570716i$
 $\lambda = 2.055343800258875 - 19.925698589564405i$
 $\lambda = 2.056135743773281 - 19.927277850934036i$
 $\lambda = 2.055703988074058 - 19.925699027143185i$
 $\lambda = 2.055808537258865 - 19.927212190497997i$
 $\lambda = 2.055989233178813 - 19.925818598797711i$
 $\lambda = 2.055571142574029 - 19.927051842916182i$
 $\lambda = 2.056175656553702 - 19.926007738156869i$
 $\lambda = 2.055436222179380 - 19.926846228108449i$
 $\lambda = 2.056260754070433 - 19.926219274354850i$
 $\lambda = 2.055397448498013 - 19.926638683046630i$
 $\lambda = 2.056258161064315 - 19.926415009927947i$
 $\lambda = 2.055435465531358 - 19.926461439746539i$
 $\lambda = 2.056191327277122 - 19.926569199417756i$
 $\lambda = 2.055524273274017 - 19.926333621494628i$
 $\lambda = 2.056087354219784 - 19.926669211297938i$
 $\lambda = 2.055636947766593 - 19.926261769090054i$
 $\lambda = 2.055971893867829 - 19.926714011814468i$
 $\lambda = 2.055749997689289 - 19.926242150848427i$
 $\lambda = 2.055865609583309 - 19.926711274637071i$
 $\lambda = 2.055846050797402 - 19.926264034225667i$
 $\lambda = 2.055782329793434 - 19.926673919295112i$
 $\lambda =$

2.055914899214570 -19.926313166512259i
 lamb =
 2.055728731755029 -19.926616757792367i
 lamb =
 2.055953175472447 -19.926374878084989i
 lamb =
 2.055705201447045 -19.926553733650746i
 lamb =
 2.055963068715971 -19.926436433504406i
 lamb =
 2.055707428837957 -19.926496019660483i
 lamb =
 2.055950529442370 -19.926488469042884i
 lamb =
 2.055728301281668 -19.926451039249272i
 lamb =
 2.055923371450793 -19.926525537144578i
 lamb =
 2.055759727269427 -19.926422318106233i
 lamb =
 2.055889588017374 -19.926545909349699i
 lamb =
 2.055794130176447 -19.926409970372838i
 lamb =
 2.055856083289297 -19.926550862702946i
 lamb =
 2.055825470561838 -19.926411578236277i
 lamb =
 2.055827903620688 -19.926543694470617i
 lamb =
 2.055849764807025 -19.926423227094201i
 lamb =
 2.055807954893693 -19.926528687169402i
 lamb =
 2.055865153286969 -19.926440497239291i
 lamb =
 2.055797121254498 -19.926510195143518i
 lamb =
 2.055871626092507 -19.926459271989604i
 lamb =
 2.055794661574170 -19.926491960325230i
 lamb =
 2.055870538237063 -19.926476287054136i
 lamb =
 2.055798750022222 -19.926476701482006i
 lamb =
 2.055864043760450 -19.926489405223865i
 lamb =
 2.055807040252915 -19.926465967805829i
 lamb =
 2.055854556516646 -19.926497646625830i

$\lambda = 2.055817160784891 - 19.926460209709727i$
 $\lambda = 2.055844313022664 - 19.926501034177782i$
 $\lambda = 2.055827083972446 - 19.926458998901342i$
 $\lambda = 2.055835077336005 - 19.926500326442216i$
 $\lambda = 2.055835345428032 - 19.926461324857485i$
 $\lambda = 2.055827995717835 - 19.926496708305208i$
 $\lambda = 2.055841119689762 - 19.926465902312525i$
 $\lambda = 2.055823583910131 - 19.926491497835897i$
 $\lambda = 2.055844178368166 - 19.926471439882597i$
 $\lambda = 2.055821814104222 - 19.926485909866685i$
 $\lambda = 2.055844768064872 - 19.926476838999218i$
 $\lambda = 2.055822262100107 - 19.926480897507918i$
 $\lambda = 2.055843447809559 - 19.926481311078369i$
 $\lambda = 2.055824276344066 - 19.926477075323398i$
 $\lambda = 2.055840921497536 - 19.926484416518267i$
 $\lambda = 2.055827137262738 - 19.926474714435081i$
 $\lambda = 2.055837892245991 - 19.926486040119034i$
 $\lambda = 2.055830185098407 - 19.926473791393072i$
 $\lambda = 2.055834955160897 - 19.926486323395338i$
 $\lambda = 2.055832904994015 - 19.926474069207330i$
 $\lambda = 2.055832534801551 - 19.926485575458482i$
 $\lambda = 2.055834967566882 - 19.926475189703645i$
 $\lambda = 2.055830865146671 - 19.926484181719701i$
 $\lambda = 2.055836230474345 - 19.926476760114497i$
 $\lambda = 2.055830003948971 - 19.926482524938137i$
 $\lambda =$

2.055836710987947 -19.926478422189710i
 lamb =
 2.055829870243382 -19.926480927431914i
 lamb =
 2.055836541389124 -19.926479897862347i
 lamb =
 2.055830293190049 -19.926479617718492i
 lamb =
 2.055835918518431 -19.926481010656367i
 lamb =
 2.055831061808601 -19.926478720258768i
 lamb =
 2.055835056724352 -19.926481685942505i
 lamb =
 2.055831967769910 -19.926478263797627i
 lamb =
 2.055834150507386 -19.926481935564592i
 lamb =
 2.055832836532010 -19.926478202137144i
 lamb =
 2.055833350018421 -19.926481833294559i
 lamb =
 2.055833545127098 -19.926478440899444i
 lamb =
 2.055832749775690 -19.926481487278064i
 lamb =
 2.055834027391466 -19.926478864615149i
 lamb =
 2.055832388849026 -19.926481014472209i
 lamb =
 2.055834269140623 -19.926479359912566i
 lamb =
 2.055832259468254 -19.926480520457627i
 lamb =
 2.055834296670501 -19.926479832289537i
 lamb =
 2.055832320525554 -19.926480086296696i
 lamb =
 2.055834162096403 -19.926480215592377i
 lamb =
 2.055832512621842 -19.926479762593338i
 lamb =
 2.055833928601360 -19.926480474670996i
 lamb =
 2.055832771952116 -19.926479569768759i
 lamb =
 2.055833657871778 -19.926480602598502i
 lamb =
 2.055833041213357 -19.926479502876582i
 lamb =
 2.055833401065144 -19.926480614309270i

$\lambda = 2.055833276651029 - 19.926479539028261i$
 $\lambda = 2.055833193761311 - 19.926480538569265i$
 $\lambda = 2.055833451182702 - 19.926479645607774i$
 $\lambda = 2.055833054621488 - 19.926480409943991i$
 $\lambda = 2.055833554152909 - 19.926479787812966i$
 $\lambda = 2.055832986984955 - 19.926480261992040i$
 $\lambda = 2.055833588642383 - 19.926479934548048i$
 $\lambda = 2.055832982387239 - 19.926480122402019i$
 $\lambda = 2.055833567385840 - 19.926480062200717i$
 $\lambda = 2.055833024956887 - 19.926480010304992i$
 $\lambda = 2.055833508287894 - 19.926480156282551i$
 $\lambda = 2.055833095788087 - 19.926479935601176i$
 $\lambda = 2.055833430327952 - 19.926480211244055i$
 $\lambda = 2.055833176627274 - 19.926479899874117i$
 $\lambda = 2.055833350377553 - 19.926480228972430i$
 $\lambda = 2.055833252490837 - 19.926479898335302i$
 $\lambda = 2.055833281176564 - 19.926480216547994i$
 $\lambda = 2.055833313094882 - 19.926479922231195i$
 $\lambda = 2.055833230472790 - 19.926480183796905i$
 $\lambda = 2.055833353191008 - 19.926479961223244i$
 $\lambda = 2.055833201150612 - 19.926480141067799i$
 $\lambda = 2.055833372044356 - 19.926480005384374i$
 $\lambda = 2.055833192068918 - 19.926480097513160i$
 $\lambda = 2.055833372359192 - 19.926480046607651i$
 $\lambda = 2.055833199293832 - 19.926480060005225i$
 $\lambda =$

2.055833358961503 -19.926480079366513i
 lamb =
 2.055833217434085 -19.926480032685490i
 lamb =
 2.055833337503734 -19.926480100880799i
 lamb =
 2.055833240847992 -19.926480017049805i
 lamb =
 2.055833313383798 -19.926480110819483i
 lamb =
 2.055833264571342 -19.926480012415389i
 lamb =
 2.055833290987183 -19.926480110707349i
 lamb =
 2.055833284897811 -19.926480016597949i
 lamb =
 2.055833273283039 -19.926480103204049i
 lamb =
 2.055833299614584 -19.926480026640270i
 lamb =
 2.055833261742855 -19.926480091399384i
 lamb =
 2.055833307947797 -19.926480039467229i
 lamb =
 2.055833256509374 -19.926480078228010i
 lamb =
 2.055833310302476 -19.926480052386715i
 lamb =
 2.055833256724138 -19.926480066061870i
 lamb =
 2.055833307890677 -19.926480063400298i
 lamb =
 2.055833260921901 -19.926480056495684i
 lamb =
 2.055833302334119 -19.926480071326168i
 lamb =
 2.055833267414031 -19.926480050307589i
 lamb =
 2.055833295308664 -19.926480075765053i
 lamb =
 2.055833274605300 -19.926480047554989i
 lamb =
 2.055833288274004 -19.926480076955478i
 lamb =
 2.055833281213051 -19.926480047755241i
 lamb =
 2.055833282307471 -19.926480075569621i
 lamb =
 2.055833286381027 -19.926480050101368i
 lamb =
 2.055833278039931 -19.926480072496588i

lamb =
 2.055833289698096 -19.926480053670709i
 lamb =
 2.055833275676775 -19.926480068649536i
 lamb =
 2.055833291144040 -19.926480057596265i
 lamb =
 2.055833275078401 -19.926480064819792i
 lamb =
 2.055833290989868 -19.926480061184527i
 lamb =
 2.055833275872248 -19.926480061588016i
 lamb =
 2.055833289679837 -19.926480063975909i
 lamb =
 2.055833277570983 -19.926480059290789i
 lamb =
 2.055833287718012 -19.926480065753381i
 lamb =
 2.055833279677118 -19.926480058033434i
 lamb =
 2.055833285575535 -19.926480066511921i
 lamb =
 2.055833281761727 -19.926480057734679i
 lamb =
 2.055833283627277 -19.926480066403521i
 lamb =
 2.055833283511932 -19.926480058188140i
 lamb =
 2.055833282119868 -19.926480065672671i
 lamb =
 2.055833284748224 -19.926480059126749i
 lamb =
 2.055833281167736 -19.926480064594703i
 lamb =
 2.055833285416811 -19.926480060279538i
 lamb =
 2.055833280770377 -19.926480063425597i
 lamb =
 2.055833285564792 -19.926480061414047i
 lamb =
 2.055833280842648 -19.926480062367958i
 lamb =
 2.055833285306429 -19.926480062361730i
 lamb =
 2.055833281250036 -19.926480061554081i
 lamb =
 2.055833284788039 -19.926480063026887i
 lamb =
 2.055833281842177 -19.926480061044238i
 lamb =

```

2.055833284157194 -19.926480063382179i
lamb =
2.055833282480022 -19.926480060836404i
lamb =
2.055833283539858 -19.926480063454775i
lamb =
2.055833283054085 -19.926480060882938i
lamb =
2.055833283026807 -19.926480063307917i
lamb =
2.055833283493423 -19.926480061109839i
lamb =
2.055833282669017 -19.926480063021728i
lamb =
2.055833283766328 -19.926480061435019i
lamb =
2.055833282480342 -19.926480062676585i

```

After 100 iterations, 2 (nearly 3) decimal places of accuracy

After 200 iterations, 5 (nearly 6) decimal places of accuracy

After 300 iterations, 8 (nearly 9) decimal places of accuracy

After 400 iterations, 10 (nearly 11) decimal places of accuracy

After 500 iterations, 13 decimal places of accuracy

... it would appear that the increase in accuracy is linearly proportional to the number of iterations (not great)

```

function lamb = power_iteration(A,v)
    for k=1:300
        w = A*v;
        v = w./norm(w);
        lamb = v' * A * v
    end
end

```