

## Sin Function

```
In [ ]: #used a function that takes in x
#This function does the Taylor Series to find the sin of x

def sined(x):
    #I have 10^-8 as the place to stop for what to add to it
    number =10**-8

    #variables here used for keeping values in track.
    #answer is for what is returned
    #added is for what will be added or subtracted from it
    #factor keeps track if you add or subtract here
    #nube is the factorial number
    #k is the number we are on for Taylor Series
    answer = 0.0
    added = 1.0
    factor = 1
    nube = 1
    k = 0

    #while Loop loop until the absolute value of the number added or subtracted is less
    while(added > number):
        #used as a fail safe for zero because we do not want 0 divided by the w
        if(k == 0):
            answer = x

        #for all other cases
        else:
            #nube is multiplied by (2*k+1) and (2*k)
            #done because Taylor series has odd number version for factorial on each
            nube = nube * (2*k + 1) * (2*k)
            #we make number to add or subtract for the Taylor Series
            added = ((x**(2*k+1))/nube)

            #answer is either minus or plus, order alternates, but to keep on track
            answer += factor*added
            #factor alternates, k is increased by 1
            factor *= -1
            k+=1
    #returns the answer
    return answer
```

## Cos Function

```
In [ ]: #function for cos(x)
#function just is (1-sin(x)**2)**.5
def cosined(x):
    return ((1-sined(x)**2)**.5)
```

## Table of cos vs sin vs x

```
In [ ]: #tabulate added for the table
#sympy used for more accurate pi
#numpy used to linspace
from tabulate import tabulate
from sympy import sin, pi
import numpy as np

#reused from Session 5
#pi type is different than float, so I need it to be float
#linspace is used to generate 1000 values from 0 to 2pi in same increasing amount
v = float(2*pi)
man = np.linspace(0.0, v, num=1000)

#list made for sin operations and one for cos operations
#for loop used to append all the sin values and cos values
#if statements used to give the exact value for pi related numbers since pi is not
san = []
can = []
for i in man:
    #san.append(i)
    if(i == v or i == v/2):
        san.append(0.0)
        can.append(-1.0)
    elif(i == v/4):
        san.append(1.0)
        can.append(0.0)
    elif(i == v/(2/3)):
        can.append(0.0)
        san.append(-1.0)
    else:
        san.append(float(sined(i)))
        can.append(float(cosined(i)))

#new list as a list of lists for table
#appended the string of cos(x), sin(x), and x for the top labeling
#for loop from 0 to 1000
#placeholder used to take in a list of the cos(x), sin(x), and x for that index into
#placeholder is added to the list as a list for the list of lists.
new = []
heading = ["sin(x)", "cos(x)", "x"]
for x in range(0,1000):
    placeholder = []
    placeholder.append(san[x])
    placeholder.append(can[x])
    placeholder.append(man[x])
    new.append(placeholder)
#print the list is printed into columns with tabulate
print(tabulate(new, tablefmt="grid", headers=heading, floatfmt=".3f"))
```

$\sin(x)$	$\cos(x)$	$x$
0.000	1.000	0.000
0.006	1.000	0.006
0.013	1.000	0.013
0.019	1.000	0.019
0.025	1.000	0.025
0.031	1.000	0.031
0.038	0.999	0.038
0.044	0.999	0.044
0.050	0.999	0.050
0.057	0.998	0.057
0.063	0.998	0.063
0.069	0.998	0.069
0.075	0.997	0.075
0.082	0.997	0.082
0.088	0.996	0.088
0.094	0.996	0.094
0.100	0.995	0.101
0.107	0.994	0.107
0.113	0.994	0.113
0.119	0.993	0.120
0.125	0.992	0.126
0.132	0.991	0.132
0.138	0.990	0.138
0.144	0.990	0.145
0.150	0.989	0.151
0.157	0.988	0.157
0.163	0.987	0.164

0.169	0.986	0.170
0.175	0.985	0.176
0.181	0.983	0.182
0.188	0.982	0.189
0.194	0.981	0.195
0.200	0.980	0.201
0.206	0.979	0.208
0.212	0.977	0.214
0.218	0.976	0.220
0.224	0.974	0.226
0.231	0.973	0.233
0.237	0.972	0.239
0.243	0.970	0.245
0.249	0.969	0.252
0.255	0.967	0.258
0.261	0.965	0.264
0.267	0.964	0.270
0.273	0.962	0.277
0.279	0.960	0.283
0.285	0.958	0.289
0.291	0.957	0.296
0.297	0.955	0.302
0.303	0.953	0.308
0.309	0.951	0.314
0.315	0.949	0.321
0.321	0.947	0.327
0.327	0.945	0.333
0.333	0.943	0.340

0.339	0.941	0.346
0.345	0.939	0.352
0.351	0.936	0.359
0.357	0.934	0.365
0.363	0.932	0.371
0.368	0.930	0.377
0.374	0.927	0.384
0.380	0.925	0.390
0.386	0.923	0.396
0.392	0.920	0.403
0.398	0.918	0.409
0.403	0.915	0.415
0.409	0.913	0.421
0.415	0.910	0.428
0.420	0.907	0.434
0.426	0.905	0.440
0.432	0.902	0.447
0.438	0.899	0.453
0.443	0.896	0.459
0.449	0.894	0.465
0.454	0.891	0.472
0.460	0.888	0.478
0.466	0.885	0.484
0.471	0.882	0.491
0.477	0.879	0.497
0.482	0.876	0.503
0.488	0.873	0.509
0.493	0.870	0.516

0.499	0.867	0.522
0.504	0.864	0.528
0.510	0.860	0.535
0.515	0.857	0.541
0.520	0.854	0.547
0.526	0.851	0.553
0.531	0.847	0.560
0.536	0.844	0.566
0.542	0.841	0.572
0.547	0.837	0.579
0.552	0.834	0.585
0.557	0.830	0.591
0.563	0.827	0.598
0.568	0.823	0.604
0.573	0.820	0.610
0.578	0.816	0.616
0.583	0.812	0.623
0.588	0.809	0.629
0.593	0.805	0.635
0.598	0.801	0.642
0.603	0.797	0.648
0.608	0.794	0.654
0.613	0.790	0.660
0.618	0.786	0.667
0.623	0.782	0.673
0.628	0.778	0.679
0.633	0.774	0.686
0.638	0.770	0.692

0.643	0.766	0.698
0.648	0.762	0.704
0.652	0.758	0.711
0.657	0.754	0.717
0.662	0.750	0.723
0.667	0.745	0.730
0.671	0.741	0.736
0.676	0.737	0.742
0.681	0.733	0.748
0.685	0.728	0.755
0.690	0.724	0.761
0.694	0.720	0.767
0.699	0.715	0.774
0.703	0.711	0.780
0.708	0.707	0.786
0.712	0.702	0.792
0.716	0.698	0.799
0.721	0.693	0.805
0.725	0.689	0.811
0.730	0.684	0.818
0.734	0.679	0.824
0.738	0.675	0.830
0.742	0.670	0.837
0.747	0.665	0.843
0.751	0.661	0.849
0.755	0.656	0.855
0.759	0.651	0.862
0.763	0.646	0.868

0.767	0.642	0.874
0.771	0.637	0.881
0.775	0.632	0.887
0.779	0.627	0.893
0.783	0.622	0.899
0.787	0.617	0.906
0.791	0.612	0.912
0.795	0.607	0.918
0.798	0.602	0.925
0.802	0.597	0.931
0.806	0.592	0.937
0.810	0.587	0.943
0.813	0.582	0.950
0.817	0.577	0.956
0.821	0.572	0.962
0.824	0.566	0.969
0.828	0.561	0.975
0.831	0.556	0.981
0.835	0.551	0.987
0.838	0.546	0.994
0.841	0.540	1.000
0.845	0.535	1.006
0.848	0.530	1.013
0.852	0.524	1.019
0.855	0.519	1.025
0.858	0.514	1.031
0.861	0.508	1.038
0.864	0.503	1.044

0.868	0.497	1.050
0.871	0.492	1.057
0.874	0.486	1.063
0.877	0.481	1.069
0.880	0.475	1.076
0.883	0.470	1.082
0.886	0.464	1.088
0.889	0.459	1.094
0.892	0.453	1.101
0.894	0.447	1.107
0.897	0.442	1.113
0.900	0.436	1.120
0.903	0.430	1.126
0.905	0.425	1.132
0.908	0.419	1.138
0.911	0.413	1.145
0.913	0.408	1.151
0.916	0.402	1.157
0.918	0.396	1.164
0.921	0.390	1.170
0.923	0.384	1.176
0.926	0.379	1.182
0.928	0.373	1.189
0.930	0.367	1.195
0.933	0.361	1.201
0.935	0.355	1.208
0.937	0.349	1.214
0.939	0.343	1.220

0.941	0.338	1.226
0.943	0.332	1.233
0.945	0.326	1.239
0.947	0.320	1.245
0.949	0.314	1.252
0.951	0.308	1.258
0.953	0.302	1.264
0.955	0.296	1.270
0.957	0.290	1.277
0.959	0.284	1.283
0.961	0.278	1.289
0.962	0.272	1.296
0.964	0.266	1.302
0.966	0.260	1.308
0.967	0.253	1.315
0.969	0.247	1.321
0.970	0.241	1.327
0.972	0.235	1.333
0.973	0.229	1.340
0.975	0.223	1.346
0.976	0.217	1.352
0.978	0.211	1.359
0.979	0.205	1.365
0.980	0.198	1.371
0.981	0.192	1.377
0.983	0.186	1.384
0.984	0.180	1.390
0.985	0.174	1.396

0.986	0.167	1.403
0.987	0.161	1.409
0.988	0.155	1.415
0.989	0.149	1.421
0.990	0.143	1.428
0.991	0.136	1.434
0.991	0.130	1.440
0.992	0.124	1.447
0.993	0.118	1.453
0.994	0.111	1.459
0.994	0.105	1.465
0.995	0.099	1.472
0.996	0.093	1.478
0.996	0.086	1.484
0.997	0.080	1.491
0.997	0.074	1.497
0.998	0.068	1.503
0.998	0.061	1.509
0.998	0.055	1.516
0.999	0.049	1.522
0.999	0.042	1.528
0.999	0.036	1.535
1.000	0.030	1.541
1.000	0.024	1.547
1.000	0.017	1.554
1.000	0.011	1.560
1.000	0.005	1.566
1.000	0.002	1.572

1.000	0.008	1.579
1.000	0.014	1.585
1.000	0.020	1.591
1.000	0.027	1.598
0.999	0.033	1.604
0.999	0.039	1.610
0.999	0.046	1.616
0.999	0.052	1.623
0.998	0.058	1.629
0.998	0.064	1.635
0.997	0.071	1.642
0.997	0.077	1.648
0.997	0.083	1.654
0.996	0.090	1.660
0.995	0.096	1.667
0.995	0.102	1.673
0.994	0.108	1.679
0.993	0.115	1.686
0.993	0.121	1.692
0.992	0.127	1.698
0.991	0.133	1.704
0.990	0.139	1.711
0.989	0.146	1.717
0.988	0.152	1.723
0.987	0.158	1.730
0.986	0.164	1.736
0.985	0.171	1.742
0.984	0.177	1.748

0.983	0.183	1.755
0.982	0.189	1.761
0.981	0.195	1.767
0.979	0.201	1.774
0.978	0.208	1.780
0.977	0.214	1.786
0.976	0.220	1.793
0.974	0.226	1.799
0.973	0.232	1.805
0.971	0.238	1.811
0.970	0.244	1.818
0.968	0.250	1.824
0.967	0.257	1.830
0.965	0.263	1.837
0.963	0.269	1.843
0.962	0.275	1.849
0.960	0.281	1.855
0.958	0.287	1.862
0.956	0.293	1.868
0.954	0.299	1.874
0.952	0.305	1.881
0.950	0.311	1.887
0.948	0.317	1.893
0.946	0.323	1.899
0.944	0.329	1.906
0.942	0.335	1.912
0.940	0.341	1.918
0.938	0.346	1.925

0.936	0.352	1.931
0.934	0.358	1.937
0.931	0.364	1.943
0.929	0.370	1.950
0.927	0.376	1.956
0.924	0.382	1.962
0.922	0.387	1.969
0.919	0.393	1.975
0.917	0.399	1.981
0.914	0.405	1.987
0.912	0.410	1.994
0.909	0.416	2.000
0.907	0.422	2.006
0.904	0.428	2.013
0.901	0.433	2.019
0.899	0.439	2.025
0.896	0.445	2.032
0.893	0.450	2.038
0.890	0.456	2.044
0.887	0.461	2.050
0.884	0.467	2.057
0.881	0.473	2.063
0.878	0.478	2.069
0.875	0.484	2.076
0.872	0.489	2.082
0.869	0.495	2.088
0.866	0.500	2.094
0.863	0.505	2.101

0.860	0.511	2.107
0.856	0.516	2.113
0.853	0.522	2.120
0.850	0.527	2.126
0.847	0.532	2.132
0.843	0.538	2.138
0.840	0.543	2.145
0.836	0.548	2.151
0.833	0.553	2.157
0.829	0.559	2.164
0.826	0.564	2.170
0.822	0.569	2.176
0.819	0.574	2.182
0.815	0.579	2.189
0.811	0.584	2.195
0.808	0.590	2.201
0.804	0.595	2.208
0.800	0.600	2.214
0.796	0.605	2.220
0.793	0.610	2.226
0.789	0.615	2.233
0.785	0.620	2.239
0.781	0.625	2.245
0.777	0.629	2.252
0.773	0.634	2.258
0.769	0.639	2.264
0.765	0.644	2.271
0.761	0.649	2.277

0.757	0.654	2.283
0.753	0.658	2.289
0.749	0.663	2.296
0.744	0.668	2.302
0.740	0.672	2.308
0.736	0.677	2.315
0.732	0.682	2.321
0.727	0.686	2.327
0.723	0.691	2.333
0.719	0.695	2.340
0.714	0.700	2.346
0.710	0.704	2.352
0.705	0.709	2.359
0.701	0.713	2.365
0.696	0.718	2.371
0.692	0.722	2.377
0.687	0.726	2.384
0.683	0.731	2.390
0.678	0.735	2.396
0.674	0.739	2.403
0.669	0.743	2.409
0.664	0.748	2.415
0.659	0.752	2.421
0.655	0.756	2.428
0.650	0.760	2.434
0.645	0.764	2.440
0.640	0.768	2.447
0.636	0.772	2.453

0.631	0.776	2.459
0.626	0.780	2.465
0.621	0.784	2.472
0.616	0.788	2.478
0.611	0.792	2.484
0.606	0.796	2.491
0.601	0.799	2.497
0.596	0.803	2.503
0.591	0.807	2.510
0.586	0.810	2.516
0.581	0.814	2.522
0.576	0.818	2.528
0.570	0.821	2.535
0.565	0.825	2.541
0.560	0.829	2.547
0.555	0.832	2.554
0.550	0.835	2.560
0.544	0.839	2.566
0.539	0.842	2.572
0.534	0.846	2.579
0.528	0.849	2.585
0.523	0.852	2.591
0.518	0.856	2.598
0.512	0.859	2.604
0.507	0.862	2.610
0.501	0.865	2.616
0.496	0.868	2.623
0.490	0.871	2.629

0.485	0.875	2.635
0.479	0.878	2.642
0.474	0.881	2.648
0.468	0.884	2.654
0.463	0.886	2.660
0.457	0.889	2.667
0.452	0.892	2.673
0.446	0.895	2.679
0.440	0.898	2.686
0.435	0.901	2.692
0.429	0.903	2.698
0.423	0.906	2.704
0.418	0.909	2.711
0.412	0.911	2.717
0.406	0.914	2.723
0.400	0.916	2.730
0.395	0.919	2.736
0.389	0.921	2.742
0.383	0.924	2.749
0.377	0.926	2.755
0.371	0.928	2.761
0.366	0.931	2.767
0.360	0.933	2.774
0.354	0.935	2.780
0.348	0.938	2.786
0.342	0.940	2.793
0.336	0.942	2.799
0.330	0.944	2.805

0.324	0.946	2.811
0.318	0.948	2.818
0.312	0.950	2.824
0.306	0.952	2.830
0.300	0.954	2.837
0.294	0.956	2.843
0.288	0.958	2.849
0.282	0.959	2.855
0.276	0.961	2.862
0.270	0.963	2.868
0.264	0.964	2.874
0.258	0.966	2.881
0.252	0.968	2.887
0.246	0.969	2.893
0.240	0.971	2.899
0.234	0.972	2.906
0.228	0.974	2.912
0.221	0.975	2.918
0.215	0.977	2.925
0.209	0.978	2.931
0.203	0.979	2.937
0.197	0.980	2.943
0.191	0.982	2.950
0.184	0.983	2.956
0.178	0.984	2.962
0.172	0.985	2.969
0.166	0.986	2.975
0.160	0.987	2.981

0.153	0.988	2.988
0.147	0.989	2.994
0.141	0.990	3.000
0.135	0.991	3.006
0.129	0.992	3.013
0.122	0.992	3.019
0.116	0.993	3.025
0.110	0.994	3.032
0.104	0.995	3.038
0.097	0.995	3.044
0.091	0.996	3.050
0.085	0.996	3.057
0.079	0.997	3.063
0.072	0.997	3.069
0.066	0.998	3.076
0.060	0.998	3.082
0.053	0.999	3.088
0.047	0.999	3.094
0.041	0.999	3.101
0.035	0.999	3.107
0.028	1.000	3.113
0.022	1.000	3.120
0.016	1.000	3.126
0.009	1.000	3.132
0.003	1.000	3.138
-0.003	1.000	3.145
-0.009	1.000	3.151
-0.016	1.000	3.157

-0.022	1.000	3.164
-0.028	1.000	3.170
-0.035	0.999	3.176
-0.041	0.999	3.182
-0.047	0.999	3.189
-0.053	0.999	3.195
-0.060	0.998	3.201
-0.066	0.998	3.208
-0.072	0.997	3.214
-0.079	0.997	3.220
-0.085	0.996	3.227
-0.091	0.996	3.233
-0.097	0.995	3.239
-0.104	0.995	3.245
-0.110	0.994	3.252
-0.116	0.993	3.258
-0.122	0.992	3.264
-0.129	0.992	3.271
-0.135	0.991	3.277
-0.141	0.990	3.283
-0.147	0.989	3.289
-0.153	0.988	3.296
-0.160	0.987	3.302
-0.166	0.986	3.308
-0.172	0.985	3.315
-0.178	0.984	3.321
-0.184	0.983	3.327
-0.191	0.982	3.333

-0.197	0.980	3.340
-0.203	0.979	3.346
-0.209	0.978	3.352
-0.215	0.977	3.359
-0.221	0.975	3.365
-0.228	0.974	3.371
-0.234	0.972	3.377
-0.240	0.971	3.384
-0.246	0.969	3.390
-0.252	0.968	3.396
-0.258	0.966	3.403
-0.264	0.964	3.409
-0.270	0.963	3.415
-0.276	0.961	3.421
-0.282	0.959	3.428
-0.288	0.958	3.434
-0.294	0.956	3.440
-0.300	0.954	3.447
-0.306	0.952	3.453
-0.312	0.950	3.459
-0.318	0.948	3.466
-0.324	0.946	3.472
-0.330	0.944	3.478
-0.336	0.942	3.484
-0.342	0.940	3.491
-0.348	0.938	3.497
-0.354	0.935	3.503
-0.360	0.933	3.510

-0.366	0.931	3.516	
-0.371	0.928	3.522	
-0.377	0.926	3.528	
-0.383	0.924	3.535	
-0.389	0.921	3.541	
-0.395	0.919	3.547	
-0.400	0.916	3.554	
-0.406	0.914	3.560	
-0.412	0.911	3.566	
-0.418	0.909	3.572	
-0.423	0.906	3.579	
-0.429	0.903	3.585	
-0.435	0.901	3.591	
-0.440	0.898	3.598	
-0.446	0.895	3.604	
-0.452	0.892	3.610	
-0.457	0.889	3.616	
-0.463	0.886	3.623	
-0.468	0.884	3.629	
-0.474	0.881	3.635	
-0.479	0.878	3.642	
-0.485	0.875	3.648	
-0.490	0.871	3.654	
-0.496	0.868	3.660	
-0.501	0.865	3.667	
-0.507	0.862	3.673	
-0.512	0.859	3.679	
-0.518	0.856	3.686	

-0.523	0.852	3.692
-0.528	0.849	3.698
-0.534	0.846	3.705
-0.539	0.842	3.711
-0.544	0.839	3.717
-0.550	0.835	3.723
-0.555	0.832	3.730
-0.560	0.829	3.736
-0.565	0.825	3.742
-0.570	0.821	3.749
-0.576	0.818	3.755
-0.581	0.814	3.761
-0.586	0.810	3.767
-0.591	0.807	3.774
-0.596	0.803	3.780
-0.601	0.799	3.786
-0.606	0.796	3.793
-0.611	0.792	3.799
-0.616	0.788	3.805
-0.621	0.784	3.811
-0.626	0.780	3.818
-0.631	0.776	3.824
-0.636	0.772	3.830
-0.640	0.768	3.837
-0.645	0.764	3.843
-0.650	0.760	3.849
-0.655	0.756	3.855
-0.659	0.752	3.862

-0.664	0.748	3.868
-0.669	0.743	3.874
-0.674	0.739	3.881
-0.678	0.735	3.887
-0.683	0.731	3.893
-0.687	0.726	3.899
-0.692	0.722	3.906
-0.696	0.718	3.912
-0.701	0.713	3.918
-0.705	0.709	3.925
-0.710	0.704	3.931
-0.714	0.700	3.937
-0.719	0.695	3.944
-0.723	0.691	3.950
-0.727	0.686	3.956
-0.732	0.682	3.962
-0.736	0.677	3.969
-0.740	0.672	3.975
-0.744	0.668	3.981
-0.749	0.663	3.988
-0.753	0.658	3.994
-0.757	0.654	4.000
-0.761	0.649	4.006
-0.765	0.644	4.013
-0.769	0.639	4.019
-0.773	0.634	4.025
-0.777	0.629	4.032
-0.781	0.625	4.038

-0.785	0.620	4.044
-0.789	0.615	4.050
-0.793	0.610	4.057
-0.796	0.605	4.063
-0.800	0.600	4.069
-0.804	0.595	4.076
-0.808	0.590	4.082
-0.811	0.584	4.088
-0.815	0.579	4.094
-0.819	0.574	4.101
-0.822	0.569	4.107
-0.826	0.564	4.113
-0.829	0.559	4.120
-0.833	0.553	4.126
-0.836	0.548	4.132
-0.840	0.543	4.138
-0.843	0.538	4.145
-0.847	0.532	4.151
-0.850	0.527	4.157
-0.853	0.522	4.164
-0.856	0.516	4.170
-0.860	0.511	4.176
-0.863	0.505	4.183
-0.866	0.500	4.189
-0.869	0.495	4.195
-0.872	0.489	4.201
-0.875	0.484	4.208
-0.878	0.478	4.214

-0.881	0.473	4.220
-0.884	0.467	4.227
-0.887	0.461	4.233
-0.890	0.456	4.239
-0.893	0.450	4.245
-0.896	0.445	4.252
-0.899	0.439	4.258
-0.901	0.433	4.264
-0.904	0.428	4.271
-0.907	0.422	4.277
-0.909	0.416	4.283
-0.912	0.410	4.289
-0.914	0.405	4.296
-0.917	0.399	4.302
-0.919	0.393	4.308
-0.922	0.387	4.315
-0.924	0.382	4.321
-0.927	0.376	4.327
-0.929	0.370	4.333
-0.931	0.364	4.340
-0.934	0.358	4.346
-0.936	0.352	4.352
-0.938	0.346	4.359
-0.940	0.341	4.365
-0.942	0.335	4.371
-0.944	0.329	4.377
-0.946	0.323	4.384
-0.948	0.317	4.390

-0.950	0.311	4.396
-0.952	0.305	4.403
-0.954	0.299	4.409
-0.956	0.293	4.415
-0.958	0.287	4.422
-0.960	0.281	4.428
-0.962	0.275	4.434
-0.963	0.269	4.440
-0.965	0.263	4.447
-0.967	0.257	4.453
-0.968	0.250	4.459
-0.970	0.244	4.466
-0.971	0.238	4.472
-0.973	0.232	4.478
-0.974	0.226	4.484
-0.976	0.220	4.491
-0.977	0.214	4.497
-0.978	0.208	4.503
-0.979	0.201	4.510
-0.981	0.195	4.516
-0.982	0.189	4.522
-0.983	0.183	4.528
-0.984	0.177	4.535
-0.985	0.171	4.541
-0.986	0.164	4.547
-0.987	0.158	4.554
-0.988	0.152	4.560
-0.989	0.146	4.566

-0.990	0.139	4.572
-0.991	0.133	4.579
-0.992	0.127	4.585
-0.993	0.121	4.591
-0.993	0.115	4.598
-0.994	0.108	4.604
-0.995	0.102	4.610
-0.995	0.096	4.616
-0.996	0.090	4.623
-0.997	0.083	4.629
-0.997	0.077	4.635
-0.997	0.071	4.642
-0.998	0.064	4.648
-0.998	0.058	4.654
-0.999	0.052	4.661
-0.999	0.046	4.667
-0.999	0.039	4.673
-0.999	0.033	4.679
-1.000	0.027	4.686
-1.000	0.020	4.692
-1.000	0.014	4.698
-1.000	0.008	4.705
-1.000	0.002	4.711
-1.000	0.005	4.717
-1.000	0.011	4.723
-1.000	0.017	4.730
-1.000	0.024	4.736
-1.000	0.030	4.742

-0.999	0.036	4.749
-0.999	0.042	4.755
-0.999	0.049	4.761
-0.998	0.055	4.767
-0.998	0.061	4.774
-0.998	0.068	4.780
-0.997	0.074	4.786
-0.997	0.080	4.793
-0.996	0.086	4.799
-0.996	0.093	4.805
-0.995	0.099	4.811
-0.994	0.105	4.818
-0.994	0.111	4.824
-0.993	0.118	4.830
-0.992	0.124	4.837
-0.991	0.130	4.843
-0.991	0.136	4.849
-0.990	0.143	4.855
-0.989	0.149	4.862
-0.988	0.155	4.868
-0.987	0.161	4.874
-0.986	0.167	4.881
-0.985	0.174	4.887
-0.984	0.180	4.893
-0.983	0.186	4.900
-0.981	0.192	4.906
-0.980	0.198	4.912
-0.979	0.205	4.918

-0.978	0.211	4.925
-0.976	0.217	4.931
-0.975	0.223	4.937
-0.973	0.229	4.944
-0.972	0.235	4.950
-0.970	0.241	4.956
-0.969	0.247	4.962
-0.967	0.253	4.969
-0.966	0.260	4.975
-0.964	0.266	4.981
-0.962	0.272	4.988
-0.961	0.278	4.994
-0.959	0.284	5.000
-0.957	0.290	5.006
-0.955	0.296	5.013
-0.953	0.302	5.019
-0.951	0.308	5.025
-0.949	0.314	5.032
-0.947	0.320	5.038
-0.945	0.326	5.044
-0.943	0.332	5.050
-0.941	0.338	5.057
-0.939	0.343	5.063
-0.937	0.349	5.069
-0.935	0.355	5.076
-0.933	0.361	5.082
-0.930	0.367	5.088
-0.928	0.373	5.094

-0.926	0.379	5.101
-0.923	0.384	5.107
-0.921	0.390	5.113
-0.918	0.396	5.120
-0.916	0.402	5.126
-0.913	0.408	5.132
-0.911	0.413	5.139
-0.908	0.419	5.145
-0.905	0.425	5.151
-0.903	0.430	5.157
-0.900	0.436	5.164
-0.897	0.442	5.170
-0.894	0.447	5.176
-0.892	0.453	5.183
-0.889	0.459	5.189
-0.886	0.464	5.195
-0.883	0.470	5.201
-0.880	0.475	5.208
-0.877	0.481	5.214
-0.874	0.486	5.220
-0.871	0.492	5.227
-0.868	0.497	5.233
-0.864	0.503	5.239
-0.861	0.508	5.245
-0.858	0.514	5.252
-0.855	0.519	5.258
-0.852	0.524	5.264
-0.848	0.530	5.271

-0.845	0.535	5.277
-0.841	0.540	5.283
-0.838	0.546	5.289
-0.835	0.551	5.296
-0.831	0.556	5.302
-0.828	0.561	5.308
-0.824	0.566	5.315
-0.821	0.572	5.321
-0.817	0.577	5.327
-0.813	0.582	5.333
-0.810	0.587	5.340
-0.806	0.592	5.346
-0.802	0.597	5.352
-0.798	0.602	5.359
-0.795	0.607	5.365
-0.791	0.612	5.371
-0.787	0.617	5.378
-0.783	0.622	5.384
-0.779	0.627	5.390
-0.775	0.632	5.396
-0.771	0.637	5.403
-0.767	0.642	5.409
-0.763	0.646	5.415
-0.759	0.651	5.422
-0.755	0.656	5.428
-0.751	0.661	5.434
-0.747	0.665	5.440
-0.742	0.670	5.447

-0.738	0.675	5.453
-0.734	0.679	5.459
-0.730	0.684	5.466
-0.725	0.689	5.472
-0.721	0.693	5.478
-0.716	0.698	5.484
-0.712	0.702	5.491
-0.708	0.707	5.497
-0.703	0.711	5.503
-0.699	0.715	5.510
-0.694	0.720	5.516
-0.690	0.724	5.522
-0.685	0.728	5.528
-0.681	0.733	5.535
-0.676	0.737	5.541
-0.671	0.741	5.547
-0.667	0.745	5.554
-0.662	0.750	5.560
-0.657	0.754	5.566
-0.652	0.758	5.572
-0.648	0.762	5.579
-0.643	0.766	5.585
-0.638	0.770	5.591
-0.633	0.774	5.598
-0.628	0.778	5.604
-0.623	0.782	5.610
-0.618	0.786	5.617
-0.613	0.790	5.623

-0.608	0.794	5.629
-0.603	0.797	5.635
-0.598	0.801	5.642
-0.593	0.805	5.648
-0.588	0.809	5.654
-0.583	0.812	5.661
-0.578	0.816	5.667
-0.573	0.820	5.673
-0.568	0.823	5.679
-0.563	0.827	5.686
-0.557	0.830	5.692
-0.552	0.834	5.698
-0.547	0.837	5.705
-0.542	0.841	5.711
-0.536	0.844	5.717
-0.531	0.847	5.723
-0.526	0.851	5.730
-0.520	0.854	5.736
-0.515	0.857	5.742
-0.510	0.860	5.749
-0.504	0.864	5.755
-0.499	0.867	5.761
-0.493	0.870	5.767
-0.488	0.873	5.774
-0.482	0.876	5.780
-0.477	0.879	5.786
-0.471	0.882	5.793
-0.466	0.885	5.799

-0.460	0.888	5.805	
-0.454	0.891	5.811	
-0.449	0.894	5.818	
-0.443	0.896	5.824	
-0.438	0.899	5.830	
-0.432	0.902	5.837	
-0.426	0.905	5.843	
-0.420	0.907	5.849	
-0.415	0.910	5.856	
-0.409	0.913	5.862	
-0.403	0.915	5.868	
-0.398	0.918	5.874	
-0.392	0.920	5.881	
-0.386	0.923	5.887	
-0.380	0.925	5.893	
-0.374	0.927	5.900	
-0.368	0.930	5.906	
-0.363	0.932	5.912	
-0.357	0.934	5.918	
-0.351	0.936	5.925	
-0.345	0.939	5.931	
-0.339	0.941	5.937	
-0.333	0.943	5.944	
-0.327	0.945	5.950	
-0.321	0.947	5.956	
-0.315	0.949	5.962	
-0.309	0.951	5.969	
-0.303	0.953	5.975	

-0.297	0.955	5.981
-0.291	0.957	5.988
-0.285	0.958	5.994
-0.279	0.960	6.000
-0.273	0.962	6.006
-0.267	0.964	6.013
-0.261	0.965	6.019
-0.255	0.967	6.025
-0.249	0.969	6.032
-0.243	0.970	6.038
-0.237	0.972	6.044
-0.231	0.973	6.050
-0.224	0.974	6.057
-0.218	0.976	6.063
-0.212	0.977	6.069
-0.206	0.979	6.076
-0.200	0.980	6.082
-0.194	0.981	6.088
-0.188	0.982	6.095
-0.181	0.983	6.101
-0.175	0.985	6.107
-0.169	0.986	6.113
-0.163	0.987	6.120
-0.157	0.988	6.126
-0.150	0.989	6.132
-0.144	0.990	6.139
-0.138	0.990	6.145
-0.132	0.991	6.151

-0.125	0.992	6.157	
-0.119	0.993	6.164	
-0.113	0.994	6.170	
-0.107	0.994	6.176	
-0.100	0.995	6.183	
-0.094	0.996	6.189	
-0.088	0.996	6.195	
-0.082	0.997	6.201	
-0.075	0.997	6.208	
-0.069	0.998	6.214	
-0.063	0.998	6.220	
-0.057	0.998	6.227	
-0.050	0.999	6.233	
-0.044	0.999	6.239	
-0.038	0.999	6.245	
-0.031	1.000	6.252	
-0.025	1.000	6.258	
-0.019	1.000	6.264	
-0.013	1.000	6.271	
-0.006	1.000	6.277	
0.000	-1.000	6.283	

### Cos vs sin vs x first 10 values

```
In [ ]: #a new list is made similar to the other
#new list as a list of lists for table
#appended the string of cos(x), sin(x), and x for the top labeling
lister = []
heading = ["sin(x)", "cos(x)", "x"]

#for loop from 0 to 10
#placeholder used to take in a list of the cos(x), sin(x), and x for that index into
#placeholder is added to the list as a list for the list of lists.
for i in range(0,10):
```

```

myhold = []
myhold.append(san[i])
myhold.append(can[i])
myhold.append(man[i])
lister.append(myhold)

#prints out the list in columns
print(tabulate(lister, tablefmt="grid", headers=heading, floatfmt=".3f"))

```

sin(x)	cos(x)	x
0.000	1.000	0.000
0.006	1.000	0.006
0.013	1.000	0.013
0.019	1.000	0.019
0.025	1.000	0.025
0.031	1.000	0.031
0.038	0.999	0.038
0.044	0.999	0.044
0.050	0.999	0.050
0.057	0.998	0.057