

$$14.- -0.6157 + 0.7880 i$$

### AUTOEVALUACIÓN 3.

- 1.-  $6 (\cos 180^\circ + i \sin 180^\circ)$
- 2.-  $2/3 (\cos 30^\circ + i \sin 30^\circ)$
- 3.-  $12 (\cos 60^\circ + i \sin 60^\circ)$
- 4.-  $24 (\cos 270^\circ + i \sin 270^\circ)$
- 5.-  $7 (\cos 300^\circ + i \sin 300^\circ)$
- 6.-  $2 (\cos 135^\circ + i \sin 135^\circ)$
- 7.-  $4/3 (\cos 90^\circ + i \sin 90^\circ)$

### AUTOEVALUACIÓN DEL CAPÍTULO VI.

- |       |        |
|-------|--------|
| 1.- 2 | 6.- 3  |
| 2.- 4 | 7.- 2  |
| 3.- 1 | 8.- 3  |
| 4.- 3 | 9.- 1  |
| 5.- 3 | 10.- 2 |

## A P É N D I C E.

### RESUMEN DE FÓRMULAS TRIGONOMÉTRICAS.

Fórmulas para un ángulo.

$$\operatorname{sen} A = \frac{1}{\operatorname{csc} A}$$

$$\operatorname{csc} A = \frac{1}{\operatorname{sen} A}$$

$$\operatorname{cos} A = \frac{1}{\operatorname{sec} A}$$

$$\operatorname{sec} A = \frac{1}{\operatorname{cos} A}$$

$$\operatorname{tan} A = \frac{1}{\operatorname{cot} A}$$

$$\operatorname{cot} A = \frac{1}{\operatorname{tan} A}$$

$$\frac{\operatorname{sen} A}{\operatorname{cos} A} = \operatorname{tan} A$$

$$\frac{\operatorname{cos} A}{\operatorname{sen} A} = \operatorname{cot} A$$

$$\operatorname{sen}(90^\circ - A) = \operatorname{cos} A$$

$$\operatorname{sen}(90^\circ + A) = \operatorname{cos} A$$

$$\operatorname{cos}(90^\circ - A) = \operatorname{sen} A$$

$$\operatorname{cos}(90^\circ + A) = -\operatorname{sen} A$$

$$\operatorname{tan}(90^\circ - A) = \operatorname{cot} A$$

$$\operatorname{tan}(90^\circ + A) = -\operatorname{cot} A$$

$$\operatorname{sen}(180^\circ - A) = \operatorname{sen} A$$

$$\operatorname{sen}(180^\circ + A) = -\operatorname{sen} A$$

$$\operatorname{cos}(180^\circ - A) = -\operatorname{cos} A$$

$$\operatorname{cos}(180^\circ + A) = -\operatorname{cos} A$$

$$\operatorname{tan}(180^\circ - A) = -\operatorname{tan} A$$

$$\operatorname{tan}(180^\circ + A) = \operatorname{tan} A$$

$$\operatorname{sen}(270^\circ - A) = -\operatorname{cos} A$$

$$\operatorname{sen}(-A) = -\operatorname{sen} A$$

$$\operatorname{cos}(270^\circ - A) = -\operatorname{sen} A$$

$$\operatorname{cos}(-A) = \operatorname{cos} A$$

$$\operatorname{tan}(270^\circ - A) = \operatorname{cot} A$$

$$\operatorname{tan}(-A) = -\operatorname{tan} A$$

$$\operatorname{sen}^2 A + \operatorname{cos}^2 A = 1$$

$$\operatorname{sec}^2 A = 1 + \operatorname{tan}^2 A$$

$$\operatorname{csc}^2 A = 1 + \operatorname{cot}^2 A$$

$$\text{sen } A = \pm \sqrt{1 - \cos^2 A}$$

$$\text{sec } A = \pm \sqrt{1 + \tan^2 A}$$

$$\text{csc } A = \pm \sqrt{1 + \cot^2 A}$$

$$\cos A = \pm \sqrt{1 - \text{sen}^2 A}$$

$$\tan A = \pm \sqrt{\text{sec}^2 A - 1}$$

$$\cot A = \pm \sqrt{\text{csc}^2 A - 1}$$

El signo es + ó -, según el cuadrante en que se halle A.

Valores numéricos de las funciones trigonométricas de ciertos ángulos.

ÁNGULO	SENO	COSENO	TANGENTE
0°	0	1	0
30°	1/2	(1/2)√3	(1/3)√3
45°	(1/2)√2	(1/2)√2	1
60°	(1/2)√3	1/2	√3
90°	1	0	no definido

Fórmulas para la resolución de triángulos planos.

Ley de los senos:

$$\frac{a}{\text{sen } A} = \frac{b}{\text{sen } B} = \frac{c}{\text{sen } C}$$

Ley de los cosenos:

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}; a^2 = b^2 + c^2 - 2bc \cos A$$

$$\cos B = \frac{c^2 + a^2 - b^2}{2ca}; b^2 = c^2 + a^2 - 2ca \cos B$$

$$\cos C = \frac{a^2 + b^2 - c^2}{2ab}; c^2 = a^2 + b^2 - 2ab \cos C$$

Medidas angulares.

Medida sexagesimal. 60 segundos (") = 1 minuto (')

60 minutos = 1 grado (°)

90 grados = 1 ángulo recto.

Medida en radianes. π radianes = 180°

$$1 \text{ radián} = \frac{180^\circ}{\pi} = 57^\circ 17' 45''$$

$$1^\circ = \frac{\pi}{180} \text{ rad} = 0.01745 \text{ radianes}$$

Signos y valores numéricos de las funciones trigonométricas.

Cuadrante en el que se halla el ángulo	Primero	Segundo	Tercero	Cuarto
Funciones (y sus recíprocas) que son positivas	todas	sen	tan	cos

I. VALORES DE FUNCIONES TRIGONOMETRICAS Y DE RADIANES

Grados	Radianes	Sen	Csc	Tan	Cot	Sec	Cos		
0° 0'	.0000	.0000		.0000		1.000	1.0000	1.5708	90° 0'
10'	.029	.029	343.8	.029	343.8	.000	.000	679	50'
20'	.058	.058	171.9	.058	171.9	.000	.000	650	40'
30'	.087	.087	114.6	.087	114.6	1.000	1.0000	1.5621	30'
40'	.116	.116	85.95	.116	85.94	.000	.09999	593	20'
50'	.145	.145	68.75	.145	68.75	.000	.999	563	10'
1° 0'	.0175	.0175	57.30	.0175	57.29	1.000	.9998	1.5533	89° 0'
10'	.204	.204	49.11	.204	49.10	.000	.998	594	50'
20'	.233	.233	42.98	.233	42.96	.000	.997	473	40'
30'	.262	.262	38.20	.262	38.19	1.000	.9997	1.5446	30'
40'	.291	.291	34.38	.291	34.37	.000	.996	417	20'
50'	.320	.320	31.26	.320	31.24	.001	.995	388	10'
2° 0'	.0349	.0349	28.65	.0349	28.64	1.001	.9994	1.5359	88° 0'
10'	.378	.378	26.45	.378	26.43	.001	.993	330	50'
20'	.407	.407	24.56	.407	24.54	.001	.992	301	40'
30'	.0436	.0436	22.93	.0437	22.90	1.001	.9990	1.5272	30'
40'	.465	.465	21.49	.466	21.47	.001	.989	243	20'
50'	.495	.494	20.23	.495	20.21	.001	.988	213	10'
3° 0'	.0523	.0523	19.11	.0524	19.08	1.001	.9986	1.5184	87° 0'
10'	.553	.552	18.10	.553	18.07	.002	.985	153	50'
20'	.582	.581	17.20	.582	17.17	.002	.983	126	40'
30'	.0611	.0610	16.38	.0612	16.35	1.002	.9981	1.5097	30'
40'	.640	.640	15.64	.641	15.60	.002	.980	068	20'
50'	.669	.669	14.96	.670	14.92	.002	.978	039	10'
4° 0'	.0698	.0698	14.34	.0699	14.30	1.002	.9976	1.5010	86° 0'
10'	.727	.727	13.76	.729	13.73	.003	.974	1.4981	50'
20'	.756	.756	13.23	.758	13.20	.003	.971	952	40'
30'	.0785	.0785	12.75	.0787	12.71	1.003	.9969	1.4923	30'
40'	.814	.814	12.29	.816	12.25	.003	.967	803	20'
50'	.844	.843	11.87	.846	11.83	.004	.964	664	10'
5° 0'	.0872	.0872	11.47	.0873	11.43	1.004	.9962	1.4835	86° 0'
10'	.902	.901	11.10	.904	11.06	.004	.959	806	50'
20'	.931	.929	10.76	.934	10.71	.004	.957	777	40'
30'	.0960	.0958	10.43	.0963	10.39	1.005	.9954	1.4748	30'
40'	.980	.9787	10.13	.992	10.08	.005	.951	719	20'
50'	.1018	.1016	9.839	.1022	9.788	.005	.948	690	10'
6° 0'	.1045	.1045	9.567	.1051	9.514	1.006	.9945	1.4661	84° 0'
10'	.076	.074	9.309	.080	9.255	.006	.942	632	50'
20'	.105	.103	9.065	.110	9.010	.006	.939	603	40'
30'	.1134	.1132	8.834	.1139	8.777	1.006	.9936	1.4573	30'
40'	.164	.161	8.614	.169	8.556	.007	.932	544	20'
50'	.193	.190	8.405	.198	8.345	.007	.929	515	10'
7° 0'	.1219	.1219	8.206	.1228	8.144	1.008	.9925	1.4486	83° 0'
10'	.251	.248	8.016	.257	7.953	.008	.922	457	50'
20'	.280	.276	7.834	.287	7.770	.008	.918	428	40'
30'	.1309	.1305	7.661	.1317	7.596	1.009	.9914	1.4399	30'
40'	.338	.334	7.496	.346	7.429	.009	.911	370	20'
50'	.367	.363	7.337	.376	7.269	.009	.907	341	10'
8° 0'	.1392	.1392	7.185	.1405	7.115	1.010	.9903	1.4312	82° 0'
10'	.425	.421	7.040	.435	6.968	.010	.899	283	50'
20'	.454	.449	6.900	.465	6.827	.011	.894	254	40'
30'	.1484	.1478	6.765	.1495	6.691	1.011	.9890	1.4224	30'
40'	.513	.507	6.636	.524	6.561	.012	.886	195	20'
50'	.542	.536	6.512	.554	6.435	.012	.881	166	10'
9° 0'	.1564	.1564	6.392	.1584	6.314	1.012	.9877		81° 0'
		Cot	Sec	Cot	Tan	Csc	Sen	Radianes	Grados

I. VALORES DE FUNCIONES TRIGONOMETRICAS Y DE RADIANES

Table with columns: Grados, Radianes, Sen, Csc, Tan, Cot, Sec, Cos. Rows range from 9° 0' to 15° 0'.

II. VALORES DE FUNCIONES TRIGONOMETRICAS Y DE RADIANES

Table with columns: Grados, Radianes, Sen, Csc, Tan, Cot, Sec, Cos. Rows range from 16° 0' to 27° 0'.

I. VALORES DE FUNCIONES TRIGONOMETRICAS Y DE RADIANES

Grados	Radianes	Sen	Csc	Tan	Cot	Sec	Cos		
27° 0'	.4712	.4540	2.203	.5095	1.963	1.122	.8910	1.0000	63° 0'
10'	741	566	190	132	949	124	897	966	50'
20'	771	592	178	169	935	126	884	937	40'
30'	.4800	.4617	2.166	.5206	1.921	1.127	.8870	1.0908	30'
40'	829	643	154	243	907	129	857	879	20'
50'	858	669	142	280	894	131	843	850	10'
28° 0'	.4887	.4695	2.130	.5317	1.881	1.133	.8829	1.0821	62° 0'
10'	916	720	118	354	868	134	816	792	50'
20'	945	746	107	392	855	136	802	763	40'
30'	.4974	.4772	2.096	.5430	1.842	1.138	.8788	1.0734	30'
40'	.5003	797	085	467	829	140	774	705	20'
50'	032	823	074	505	816	142	760	676	10'
29° 0'	.5061	.4848	2.063	.5543	1.804	1.143	.8746	1.0647	61° 0'
10'	091	874	052	581	792	145	732	617	50'
20'	120	899	041	619	780	147	718	588	40'
30'	.5149	.4924	2.031	.5658	1.767	1.149	.8704	1.0559	30'
40'	178	950	020	696	756	151	689	530	20'
50'	207	.4975	010	735	744	153	675	501	10'
30° 0'	.5236	.5000	2.000	.5774	1.732	1.155	.8660	1.0472	60° 0'
10'	265	025	1.990	812	720	157	646	443	50'
20'	294	050	980	851	709	159	631	414	40'
30'	.5323	.5075	1.970	.5890	1.698	1.161	.8616	1.0385	30'
40'	352	100	961	930	686	163	601	356	20'
50'	381	125	951	.5969	675	165	587	327	10'
31° 0'	.5411	.5150	1.942	.6009	1.664	1.167	.8572	1.0297	59° 0'
10'	440	175	932	048	653	169	557	268	50'
20'	469	200	923	088	643	171	542	239	40'
30'	.5498	.5225	1.914	.6128	1.632	1.173	.8526	1.0210	30'
40'	527	250	905	168	621	175	511	181	20'
50'	556	275	896	208	611	177	496	152	10'
32° 0'	.5585	.5299	1.887	.6249	1.600	1.179	.8480	1.0123	58° 0'
10'	614	324	878	289	590	181	465	094	50'
20'	643	348	870	330	580	184	450	065	40'
30'	.5672	.5373	1.861	.6371	1.570	1.186	.8434	1.0036	30'
40'	701	398	853	412	560	188	418	1.0007	20'
50'	730	422	844	453	550	190	403	.9977	10'
33° 0'	.5760	.5446	1.836	.6494	1.540	1.192	.8387	.9948	57° 0'
10'	789	471	828	536	530	195	371	919	50'
20'	818	495	820	577	520	197	355	890	40'
30'	.5847	.5519	1.812	.6619	1.511	1.199	.8339	.9861	30'
40'	876	544	804	661	501	202	323	832	20'
50'	905	568	796	703	492	204	307	803	10'
34° 0'	.5934	.5592	1.788	.6745	1.483	1.206	.8290	.9774	56° 0'
10'	963	616	781	787	473	209	274	745	50'
20'	992	640	773	830	464	211	258	716	40'
30'	.6021	.5664	1.766	.6873	1.455	1.213	.8241	.9687	30'
40'	050	688	758	916	446	216	225	657	20'
50'	080	712	751	.6959	437	218	208	628	10'
35° 0'	.6109	.5736	1.743	.7002	1.428	1.221	.8192	.9599	55° 0'
10'	138	760	736	046	419	223	175	570	50'
20'	167	783	729	089	411	226	158	541	40'
30'	.6196	.5807	1.722	.7133	1.402	1.228	.8141	.9512	30'
40'	225	831	715	177	393	231	124	483	20'
50'	254	854	708	221	385	233	107	454	10'
36° 0'	.6283	.5878	1.701	.7265	1.376	1.236	.8090	.9425	54° 0'
		Cos	Sec	Cot	Tan	Csc	Sen	Radianes	Grados

I. VALORES DE FUNCIONES TRIGONOMETRICAS Y DE RADIANES

Grados	Radianes	Sen	Csc	Tan	Cot	Sec	Cos		
36° 0'	.6283	.5878	1.701	.7265	1.376	1.236	.8090	.9425	54° 0'
10'	312	901	695	310	368	239	073	396	50'
20'	341	925	688	355	360	241	056	367	40'
30'	.6370	.5948	1.681	.7400	1.351	1.244	8039	.9338	30'
40'	400	972	675	445	343	247	021	308	20'
50'	429	.5995	668	490	335	249	.8004	279	10'
37° 0'	.6458	.6018	1.662	.7536	1.327	1.252	.7986	.9250	53° 0'
10'	487	041	655	581	319	255	969	221	50'
20'	516	065	649	627	311	258	951	192	40'
30'	.6545	.6088	1.643	.7673	1.303	1.260	.7934	.9163	30'
40'	574	111	636	720	295	263	916	134	20'
50'	603	134	630	766	288	266	898	105	10'
38° 0'	.6632	.6157	1.624	.7813	1.280	1.269	.7880	.9076	52° 0'
10'	661	180	618	860	272	272	862	047	50'
20'	690	202	612	907	265	275	844	.9018	40'
30'	.6720	.6225	1.606	.7954	1.257	1.278	.7826	.8988	30'
40'	749	248	601	.8002	250	281	808	959	20'
50'	778	271	595	050	242	284	790	930	10'
39° 0'	.6807	.6293	1.589	.8098	1.235	1.287	.7771	.8901	51° 0'
10'	836	316	583	146	228	290	753	872	50'
20'	865	338	578	195	220	293	735	843	40'
30'	.6894	.6361	1.572	.8243	1.213	1.296	.7716	.8814	30'
40'	923	383	567	292	206	299	698	785	20'
50'	952	406	561	342	199	302	679	756	10'
40° 0'	.6981	.6428	1.556	.8391	1.192	1.305	.7660	.8727	50° 0'
10'	7010	450	550	441	185	309	642	698	50'
20'	039	472	545	491	178	312	623	668	40'
30'	.7069	.6494	1.540	.8541	1.171	1.315	.7604	.8639	30'
40'	098	517	535	591	164	318	585	610	20'
50'	127	539	529	642	157	322	566	581	10'
41° 0'	.7156	.6561	1.524	.8693	1.150	1.325	.7547	.8552	49° 0'
10'	185	583	519	744	144	328	528	523	50'
20'	214	604	514	796	137	332	509	494	40'
30'	.7243	.6626	1.509	.8847	1.130	1.335	.7490	.8465	30'
40'	272	648	504	899	124	339	470	436	20'
50'	301	670	499	.8952	117	342	451	407	10'
42° 0'	.7330	.6691	1.494	.9004	1.111	1.346	.7431	.8378	48° 0'
10'	359	713	490	057	104	349	412	348	50'
20'	389	734	485	110	098	353	392	319	40'
30'	.7418	.6756	1.480	.9163	1.091	1.356	.7373	.8290	30'
40'	447	777	476	217	085	360	353	261	20'
50'	476	799	471	271	079	364	333	232	10'
43° 0'	.7505	.6820	1.466	.9325	1.072	1.367	.7314	.8203	47° 0'
10'	534	841	462	380	066	371	294	174	50'
20'	563	862	457	435	060	375	274	145	40'
30'	.7592	.6884	1.453	.9490	1.054	1.379	.7254	.8116	30'
40'	621	905	448	545	048	382	234	087	20'
50'	650	926	444	601	042	386	214	058	10'
44° 0'	.7679	.6947	1.440	.9657	1.036	1.390	.7193	.8029	46° 0'
10'	709	967	435	713	030	394	173	.7999	50'
20'	738	.6988	431	770	024	398	153	970	40'
30'	.7767	.7009	1.427	.9827	1.018	1.402	.7133	.7941	30'
40'	796	030	423	884	012	406	112	912	20'
50'	825	050	418	.9942	006	410	092	883	10'
45° 0'	.7854	.7071	1.414	1.0000	1.0000	1.414	.7071	.7854	45° 0'
		Cos	Sec	Cot	Tan	Csc	Sen	Radianes	Grados