Binary Inductive Decision Tree by loss of information algorithm.

Decision **a** yields ***pn*** number of passes that satisfies **C,** in ***pa*** number of decided cases by **a**. ***p = pn/pa*** is the **pass rate of C by decision a**:

Decision **not-a** yields ***qn*** number of passes satisfying **C,** in ***qa*** number of decided cases by **not-a**. ***q = qn/qa*** is the **fail rate of C by decision not-a**:

$inf(C, a) = -p \cdot \log_2(p) - (1-p)\log_2(1-p)$; and

$inf(C, \neg a) = -q \cdot \log_2(q) - (1-q) \cdot \log_2(1-q)$, are information measured in number of bits,

$INF(C, a) = p\ inf(C, a) + (1-p)\ inf(C, \neg a)$ is the total information loss in classifying C by decision a.

If fail rate or pass rate is 0 or 1: $\log_2(1)=0$; and $0*\log_2(0)=0$;

The lowest INF(C,a) shall be the first decision in the decision tree. Table contains (p,q) vs. inf and INF values.

INF		q	0/n	1/12	1/11	1/10	1/9	1/8	1/7	1/6	2/11	1/5	2/9	1/4	3/11	2/7	3/10	1/3	4/11	3/8	2/5	5/12	3/7	4/9	5/11	1/2	6/11	5/9	4/7	7/12	3/5	5/8	7/11	2/3	7/10	5/7	8/11	3/4	7/9	4/5	9/11	5/6	6/7	1/13	7/8	8/9	9/10	11/12
		q	.0	.083	.091	.100	.111	.125	.143	.167	.182	.200	.222	.250	.273	.286	.300	.333	.364	.375	.400	.417	.429	.444	.455	.500	.545	.556	.571	.583	.600	.625	.636	.667	.700	.714	.727	.750	.778	.800	.818	.833	.857	.867	.875	.889	.900	.917
p	p	inf	.0	.414	.439	.469	.503	.544	.592	.650	.684	.722	.764	.811	.845	.863	.881	.918	.946	.954	.971	.980	.985	.991	.994	1.00	.994	.991	.985	.980	.971	.954	.946	.918	.881	.863	.845	.811	.764	.722	.684	.650	.592	.565	.544	.503	.469	.414
0/n	.0	.0	.0	.414	.439	.469	**.503**	.544	.592	.650	.684	**.722**	.764	.811	.845	.863	**.881**	.918	.946	.954	.971	**.980**	.985	.991	.994	1.00	**.994**	.991	.985	.980	.971	**.954**	.946	.918	.881	.863	**.845**	.811	.764	.722	.684	**.650**	.592	.565	.544	.503	**.469**	.414
1/12	.083	.414	.034	.414	.437	.464	**.496**	.533	.577	.630	.662	**.696**	.735	.778	.809	.826	**.842**	.876	.901	.909	.925	**.933**	.938	.943	.946	.951	**.946**	.943	.938	.933	.925	**.909**	.901	.876	.842	.826	**.809**	.778	.735	.696	.662	**.630**	.577	.552	.533	.496	**.464**	.414
1/11	.091	.439	.040	.416	.439	.466	**.497**	.534	.578	.631	.662	**.696**	.735	.777	.808	.825	**.841**	.875	.900	.908	.923	**.931**	.936	.941	.944	.949	**.944**	.941	.936	.931	.923	**.908**	.900	.875	.841	.825	**.808**	.777	.735	.696	.662	**.631**	.578	.553	.534	.497	**.466**	.416
1/10	.100	.469	.047	.419	.442	.469	**.500**	.536	.579	.632	.663	**.697**	.735	.777	.808	.824	**.840**	.873	.898	.906	.921	**.929**	.934	.939	.942	.947	**.942**	.939	.934	.929	.921	**.906**	.898	.873	.840	.824	**.808**	.777	.735	.697	.663	**.632**	.579	.555	.536	.500	**.469**	.419
1/9	.111	.503	**.056**	**.424**	**.447**	**.473**	**.503**	**.539**	**.582**	**.634**	**.664**	**.698**	**.735**	**.777**	**.807**	**.823**	**.839**	**.872**	**.897**	**.904**	**.919**	**.927**	**.932**	**.937**	**.940**	**.945**	**.940**	**.937**	**.932**	**.927**	**.919**	**.904**	**.897**	**.872**	**.839**	**.823**	**.807**	**.777**	**.735**	**.698**	**.664**	**.634**	**.582**	**.558**	**.539**	**.503**	**.473**	**.424**
1/8	.125	.544	.068	.430	.453	.478	**.508**	.544	.586	.637	.666	**.700**	.737	.778	.808	.823	**.839**	.871	.895	.903	.918	**.925**	.930	.935	.938	.943	**.938**	.935	.930	.925	.918	**.903**	.895	.871	.839	.823	**.808**	.778	.737	.700	.666	**.637**	.586	.562	.544	.508	**.478**	.430
1/7	.143	.592	.085	.439	.461	.487	**.516**	.550	.592	.642	.671	**.703**	.740	.780	.809	.824	**.840**	.872	.895	.903	.917	**.924**	.929	.934	.937	.942	**.937**	.934	.929	.924	.917	**.903**	.895	.872	.840	.824	**.809**	.780	.740	.703	.671	**.642**	.592	.568	.550	.516	**.487**	.439
1/6	.167	.650	.108	.453	.475	.499	**.528**	.561	.601	.650	.678	**.710**	.745	.784	.813	.828	**.843**	.874	.896	.904	.917	**.925**	.929	.934	.937	.942	**.937**	.934	.929	.925	.917	**.904**	.896	.874	.843	.828	**.813**	.784	.745	.710	.678	**.650**	.601	.579	.561	.528	**.499**	.453
2/11	.182	.684	.124	.463	.484	.508	**.536**	.569	.608	.656	.684	**.715**	.750	.788	.816	.831	**.845**	.876	.898	.905	.919	**.926**	.930	.935	.938	.943	**.938**	.935	.930	.926	.919	**.905**	.898	.876	.845	.831	**.816**	.788	.750	.715	.684	**.656**	.608	.586	.569	.536	**.508**	.463
1/5	.200	.722	**.144**	**.475**	**.496**	**.520**	**.547**	**.579**	**.618**	**.664**	**.692**	**.722**	**.756**	**.793**	**.821**	**.835**	**.849**	**.879**	**.901**	**.908**	**.921**	**.928**	**.933**	**.937**	**.940**	**.944**	**.940**	**.937**	**.933**	**.928**	**.921**	**.908**	**.901**	**.879**	**.849**	**.835**	**.821**	**.793**	**.756**	**.722**	**.692**	**.664**	**.618**	**.596**	**.579**	**.547**	**.520**	**.475**
2/9	.222	.764	.170	.492	.512	.535	**.561**	.593	.630	.675	.702	**.731**	.764	.801	.827	.841	**.855**	.884	.905	.912	.925	**.932**	.936	.941	.943	.948	**.943**	.941	.936	.932	.925	**.912**	.905	.884	.855	.841	**.827**	.801	.764	.731	.702	**.675**	.630	.609	.593	.561	**.535**	.492
1/4	.250	.811	.203	.513	.532	.555	**.580**	.610	.647	.690	.716	**.744**	.776	.811	.837	.850	**.864**	.892	.912	.919	.931	**.938**	.942	.946	.948	.953	**.948**	.946	.942	.938	.931	**.919**	.912	.892	.864	.850	**.837**	.811	.776	.744	.716	**.690**	.647	.626	.610	.580	**.555**	.513
3/11	.273	.845	.231	.532	.550	.572	**.597**	.626	.661	.703	.728	**.756**	.786	.821	.845	.858	**.871**	.898	.918	.925	.937	**.943**	.947	.951	.953	.958	**.953**	.951	.947	.943	.937	**.925**	.918	.898	.871	.858	**.845**	.821	.786	.756	.728	**.703**	.661	.641	.626	.597	**.572**	.532
2/7	.286	.863	.247	.542	.561	.582	**.606**	.635	.669	.711	.735	**.762**	.792	.826	.850	.863	**.876**	.903	.922	.928	.940	**.947**	.950	.955	.957	.961	**.957**	.955	.950	.947	.940	**.928**	.922	.903	.876	.863	**.850**	.826	.792	.762	.735	**.711**	.669	.650	.635	.606	**.582**	.542
3/10	.300	.881	**.264**	**.554**	**.572**	**.593**	**.617**	**.645**	**.679**	**.719**	**.743**	**.770**	**.799**	**.832**	**.856**	**.869**	**.881**	**.907**	**.926**	**.932**	**.944**	**.950**	**.954**	**.958**	**.960**	**.964**	**.960**	**.958**	**.954**	**.950**	**.944**	**.932**	**.926**	**.907**	**.881**	**.869**	**.856**	**.832**	**.799**	**.770**	**.743**	**.719**	**.679**	**.660**	**.645**	**.617**	**.593**	**.554**
1/3	.333	.918	.306	.582	.599	.619	**.642**	.668	.701	.739	.762	**.787**	.816	.847	.870	.882	**.894**	.918	.937	.942	.953	**.959**	.963	.967	.969	.973	**.969**	.967	.963	.959	.953	**.942**	.937	.918	.894	.882	**.870**	.847	.816	.787	.762	**.739**	.701	.682	.668	.642	**.619**	.582
4/11	.364	.946	.344	.607	.624	.642	**.664**	.690	.720	.758	.779	**.803**	.830	.860	.882	.893	**.905**	.928	.946	.951	.962	**.967**	.971	.975	.976	.980	**.976**	.975	.971	.967	.962	**.951**	.946	.928	.905	.893	**.882**	.860	.830	.803	.779	**.758**	.720	.703	.690	.664	**.642**	.607
3/8	.375	.954	.358	.617	.633	.651	**.672**	.698	.728	.764	.785	**.809**	.836	.865	.886	.897	**.909**	.932	.949	.954	.965	**.970**	.974	.977	.979	.983	**.979**	.977	.974	.970	.965	**.954**	.949	.932	.909	.897	**.886**	.865	.836	.809	.785	**.764**	.728	.711	.698	.672	**.651**	.617
2/5	.400	.971	.388	.637	.652	.670	**.690**	.715	.743	.778	.799	**.822**	.847	.875	.896	.906	**.917**	.939	.956	.961	.971	**.976**	.980	.983	.985	.988	**.985**	.983	.980	.976	.971	**.961**	.956	.939	.917	.906	**.896**	.875	.847	.822	.799	**.778**	.743	.727	.715	.690	**.670**	.637
5/12	.417	.980	**.408**	**.650**	**.665**	**.682**	**.702**	**.725**	**.753**	**.787**	**.807**	**.829**	**.854**	**.882**	**.901**	**.912**	**.922**	**.944**	**.960**	**.965**	**.975**	**.980**	**.983**	**.986**	**.988**	**.992**	**.988**	**.986**	**.983**	**.980**	**.975**	**.965**	**.960**	**.944**	**.922**	**.912**	**.901**	**.882**	**.854**	**.829**	**.807**	**.787**	**.753**	**.738**	**.725**	**.702**	**.682**	**.650**
3/7	.429	.985	.422	.659	.673	.690	**.710**	.733	.760	.794	.813	**.835**	.859	.886	.905	.915	**.926**	.947	.963	.968	.977	**.982**	.985	.989	.990	.994	**.990**	.989	.985	.982	.977	**.968**	.963	.947	.926	.915	**.905**	.886	.859	.835	.813	**.794**	.760	.745	.733	.710	**.690**	.659
4/9	.444	.991	.440	.670	.685	.701	**.720**	.742	.769	.802	.820	**.842**	.865	.891	.910	.920	**.930**	.951	.966	.971	.980	**.985**	.988	.991	.993	.996	**.993**	.991	.988	.985	.980	**.971**	.966	.951	.930	.920	**.910**	.891	.865	.842	.820	**.802**	.769	.754	.742	.720	**.701**	.670
5/11	.455	.994	.452	.678	.692	.708	**.726**	.748	.775	.806	.825	**.846**	.869	.894	.913	.923	**.933**	.953	.968	.972	.981	**.986**	.989	.992	.994	.997	**.994**	.992	.989	.986	.981	**.972**	.968	.953	.933	.923	**.913**	.894	.869	.846	.825	**.806**	.775	.760	.748	.726	**.708**	.678
1/2	.500	1.00	.500	.707	.720	.734	**.752**	.772	.796	.825	.842	**.861**	.882	.906	.923	.932	**.941**	.959	.973	.977	.985	**.990**	.993	.996	.997	1.00	**.997**	.996	.993	.990	.985	**.977**	.973	.959	.941	.932	**.923**	.906	.882	.861	.842	**.825**	.796	.782	.772	.752	**.734**	.707
6/11	.545	.994	**.542**	**.730**	**.742**	**.755**	**.771**	**.789**	**.811**	**.838**	**.853**	**.870**	**.890**	**.911**	**.926**	**.935**	**.943**	**.960**	**.972**	**.976**	**.984**	**.988**	**.990**	**.993**	**.994**	**.997**	**.994**	**.993**	**.990**	**.988**	**.984**	**.976**	**.972**	**.960**	**.943**	**.935**	**.926**	**.911**	**.890**	**.870**	**.853**	**.838**	**.811**	**.799**	**.789**	**.771**	**.755**	**.730**
5/9	.556	.991	.551	.735	.746	.759	**.774**	.792	.814	.839	.855	**.871**	.890	.911	.926	.934	**.942**	.959	.971	.975	.982	**.986**	.988	.991	.992	.995	**.992**	.991	.988	.986	.982	**.975**	.971	.959	.942	.934	**.926**	.911	.890	.871	.855	**.839**	.814	.802	.792	.774	**.759**	.735
4/7	.571	.985	.563	.740	.751	.764	**.779**	.796	.817	.842	.856	**.872**	.891	.911	.925	.933	**.941**	.957	.968	.972	.979	**.983**	.985	.988	.989	.992	**.989**	.988	.985	.983	.979	**.972**	.968	.957	.941	.933	**.925**	.911	.891	.872	.856	**.842**	.817	.805	.796	.779	**.764**	.740
7/12	.583	.980	.572	.744	.755	.767	**.781**	.798	.818	.842	.857	**.872**	.890	.910	.924	.931	**.939**	.954	.966	.969	.976	**.980**	.982	.985	.986	.988	**.986**	.985	.982	.980	.976	**.969**	.966	.954	.939	.931	**.924**	.910	.890	.872	.857	**.842**	.818	.807	.798	.781	**.767**	.744
3/5	.600	.971	.583	.748	.758	.770	**.784**	.800	.819	.843	.856	**.871**	.888	.907	.921	.928	**.935**	.950	.961	.964	.971	**.975**	.977	.979	.980	.983	**.980**	.979	.977	.975	.971	**.964**	.961	.950	.935	.928	**.921**	.907	.888	.871	.856	**.843**	.819	.808	.800	.784	**.770**	.748
5/8	.625	.954	**.597**	**.752**	**.761**	**.772**	**.785**	**.800**	**.818**	**.840**	**.853**	**.867**	**.883**	**.901**	**.914**	**.920**	**.927**	**.941**	**.951**	**.954**	**.961**	**.964**	**.966**	**.968**	**.969**	**.972**	**.969**	**.968**	**.966**	**.964**	**.961**	**.954**	**.951**	**.941**	**.927**	**.920**	**.914**	**.901**	**.883**	**.867**	**.853**	**.840**	**.818**	**.808**	**.800**	**.785**	**.772**	**.752**
7/11	.636	.946	.602	.752	.762	.772	**.785**	.799	.817	.838	.851	**.864**	.880	.897	.909	.916	**.922**	.936	.946	.949	.955	**.958**	.960	.962	.963	.965	**.963**	.962	.960	.958	.955	**.949**	.946	.936	.922	.916	**.909**	.897	.880	.864	.851	**.838**	.817	.807	.799	.785	**.772**	.752
2/3	.667	.918	.612	.750	.759	.769	**.780**	.793	.809	.829	.840	**.853**	.867	.883	.894	.900	**.906**	.918	.927	.930	.936	**.939**	.941	.943	.944	.946	**.944**	.943	.941	.939	.936	**.930**	.927	.918	.906	.900	**.894**	.883	.867	.853	.840	**.829**	.809	.800	.793	.780	**.769**	.750
7/10	.700	.881	.617	.741	.749	.758	**.768**	.780	.794	.812	.822	**.833**	.846	.860	.871	.876	**.881**	.892	.901	.903	.908	**.911**	.912	.914	.915	.917	**.915**	.914	.912	.911	.908	**.903**	.901	.892	.881	.876	**.871**	.860	.846	.833	.822	**.812**	.794	.786	.780	.768	**.758**	.741
5/7	.714	.863	.617	.735	.742	.751	**.760**	.772	.786	.802	.812	**.823**	.835	.848	.858	.863	**.868**	.879	.887	.889	.894	**.896**	.898	.900	.901	.902	**.901**	.900	.898	.896	.894	**.889**	.887	.879	.868	.863	**.858**	.848	.835	.823	.812	**.802**	.786	.778	.772	.760	**.751**	.735
8/11	.727	.845	**.615**	**.728**	**.735**	**.743**	**.752**	**.763**	**.776**	**.792**	**.801**	**.812**	**.823**	**.836**	**.845**	**.850**	**.855**	**.865**	**.873**	**.875**	**.880**	**.882**	**.883**	**.885**	**.886**	**.888**	**.886**	**.885**	**.883**	**.882**	**.880**	**.875**	**.873**	**.865**	**.855**	**.850**	**.845**	**.836**	**.823**	**.812**	**.801**	**.792**	**.776**	**.769**	**.763**	**.752**	**.743**	**.728**
3/4	.750	.811	.608	.712	.718	.726	**.734**	.744	.756	.771	.779	**.789**	.800	.811	.820	.824	**.829**	.838	.845	.847	.851	**.853**	.855	.856	.857	.858	**.857**	.856	.855	.853	.851	**.847**	.845	.838	.829	.824	**.820**	.811	.800	.789	.779	**.771**	.756	.750	.744	.734	**.726**	.712
7/9	.778	.764	.594	.686	.692	.699	**.706**	.715	.726	.739	.746	**.755**	.764	.775	.782	.786	**.790**	.798	.805	.806	.810	**.812**	.813	.815	.815	.817	**.815**	.815	.813	.812	.810	**.806**	.805	.798	.790	.786	**.782**	.775	.764	.755	.746	**.739**	.726	.720	.715	.706	**.699**	.686
4/5	.800	.722	.578	.660	.665	.671	**.678**	.686	.696	.708	.714	**.722**	.730	.740	.747	.750	**.754**	.761	.767	.768	.772	**.774**	.775	.776	.776	.778	**.776**	.776	.775	.774	.772	**.768**	.767	.761	.754	.750	**.747**	.740	.730	.722	.714	**.708**	.696	.690	.686	.678	**.671**	.660
9/11	.818	.684	.560	.635	.640	.645	**.651**	.658	.667	.678	.684	**.691**	.699	.707	.713	.717	**.720**	.727	.732	.733	.736	**.738**	.739	.740	.740	.741	**.740**	.740	.739	.738	.736	**.733**	.732	.727	.720	.717	**.713**	.707	.699	.691	.684	**.678**	.667	.662	.658	.651	**.645**	.635
5/6	.833	.650	**.542**	**.611**	**.615**	**.620**	**.626**	**.632**	**.640**	**.650**	**.656**	**.662**	**.669**	**.677**	**.683**	**.686**	**.689**	**.695**	**.699**	**.701**	**.704**	**.705**	**.706**	**.707**	**.707**	**.708**	**.707**	**.707**	**.706**	**.705**	**.704**	**.701**	**.699**	**.695**	**.689**	**.686**	**.683**	**.677**	**.669**	**.662**	**.656**	**.650**	**.640**	**.636**	**.632**	**.626**	**.620**	**.611**
6/7	.857	.592	.507	.566	.570	.574	**.579**	.585	.592	.600	.605	**.610**	.616	.623	.628	.630	**.633**	.638	.642	.643	.646	**.647**	.648	.649	.649	.650	**.649**	.649	.648	.647	.646	**.643**	.642	.638	.633	.630	**.628**	.623	.616	.610	.605	**.600**	.592	.588	.585	.579	**.574**	.566
1/13	.867	.565	.490	.545	.548	.552	**.556**	.562	.568	.576	.580	**.585**	.591	.597	.602	.604	**.607**	.612	.615	.616	.618	**.620**	.620	.621	.622	.622	**.622**	.621	.620	.620	.618	**.616**	.615	.612	.607	.604	**.602**	.597	.591	.585	.580	**.576**	.568	.565	.562	.556	**.552**	.545
7/8	.875	.544	.476	.527	.531	.534	**.539**	.544	.550	.557	.561	**.566**	.571	.577	.581	.584	**.586**	.590	.594	.595	.597	**.598**	.599	.600	.600	.601	**.600**	.600	.599	.598	.597	**.595**	.594	.590	.586	.584	**.581**	.577	.571	.566	.561	**.557**	.550	.546	.544	.539	**.534**	.527
8/9	.889	.503	.447	.493	.496	.499	**.503**	.508	.513	.520	.523	**.528**	.532	.537	.541	.543	**.545**	.549	.552	.553	.555	**.556**	.557	.557	.558	.558	**.558**	.557	.557	.556	.555	**.553**	.552	.549	.545	.543	**.541**	.537	.532	.528	.523	**.520**	.513	.510	.508	.503	**.499**	.493
9/10	.900	.469	**.422**	**.463**	**.466**	**.469**	**.472**	**.476**	**.481**	**.487**	**.490**	**.494**	**.499**	**.503**	**.507**	**.508**	**.510**	**.514**	**.517**	**.518**	**.519**	**.520**	**.521**	**.521**	**.521**	**.522**	**.521**	**.521**	**.521**	**.520**	**.519**	**.518**	**.517**	**.514**	**.510**	**.508**	**.507**	**.503**	**.499**	**.494**	**.490**	**.487**	**.481**	**.479**	**.476**	**.472**	**.469**	**.463**
11/12	.917	.414	.379	.414	.416	.418	**.421**	.425	.429	.434	.436	**.439**	.443	.447	.450	.451	**.453**	.456	.458	.459	.460	**.461**	.461	.462	.462	.463	**.462**	.462	.461	.461	.460	**.459**	.458	.456	.453	.451	**.450**	.447	.443	.439	.436	**.434**	.429	.426	.425	.421	**.418**	.414