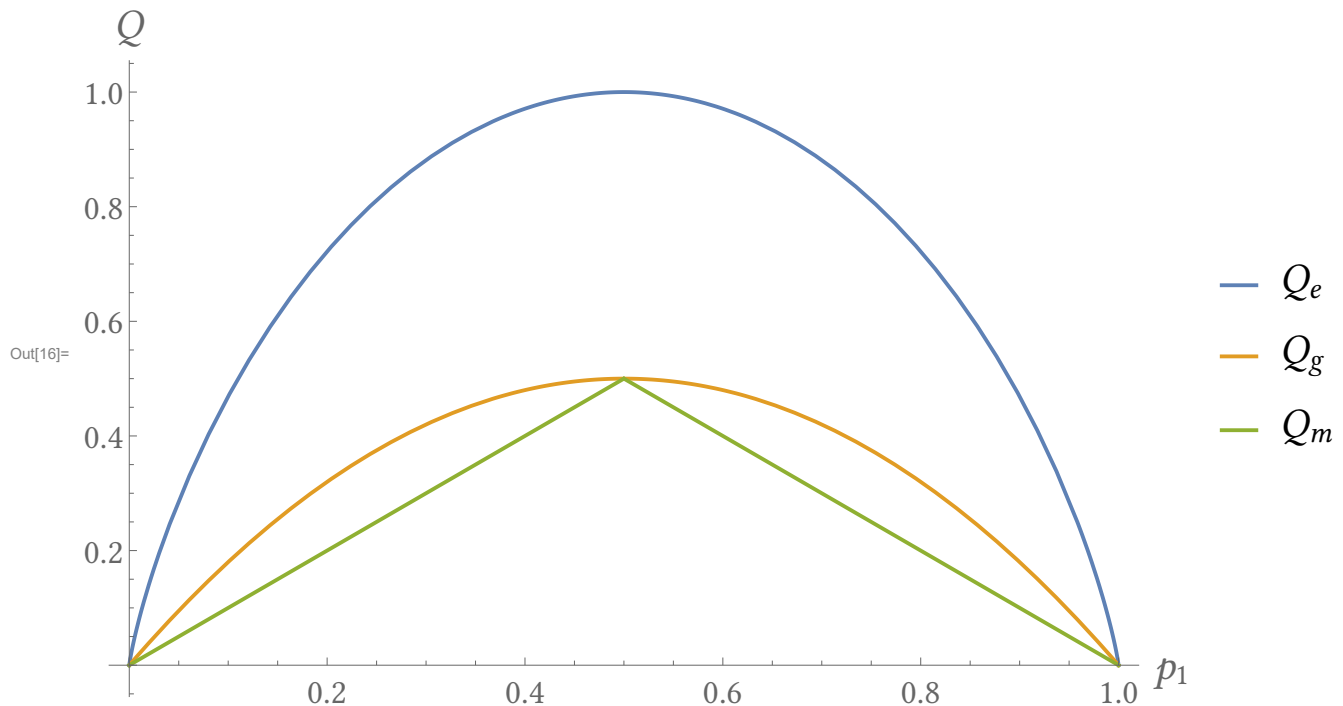


Impurity Measures

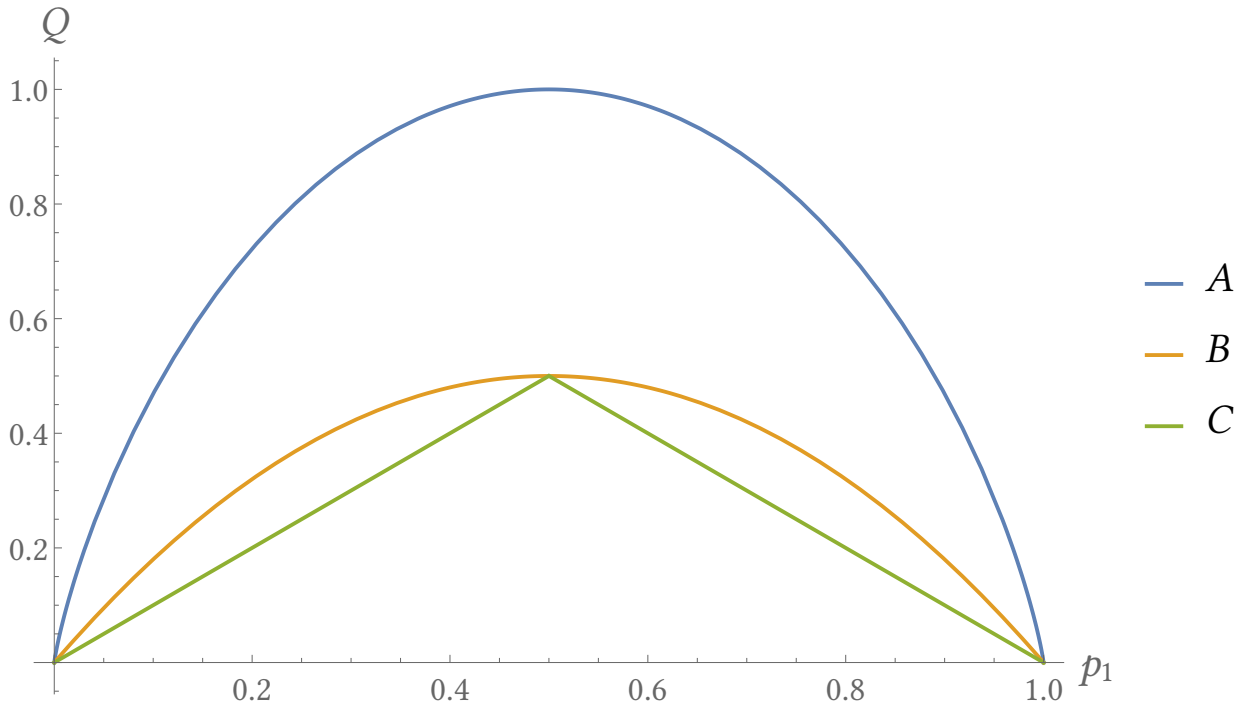
Theme

Part I: Plot Mapping

```
In[13]:= Qg[p_?ListQ] := 1 -  $\sum_{i=1}^{\text{Length}[p]} p[[i]]^2$   
Qm[p_?ListQ] := 1 - Max[p]  
Qe[p_?ListQ] := -  $\sum_{i=1}^{\text{Length}[p]} \begin{cases} p[[i]] * \text{Log2}[p[[i]]] & p[[i]] \neq 0 \\ 0 & \text{True} \end{cases}$   
  
In[16]:= plotMeasures = Plot[{Qe[{p1, 1 - p1}], Qg[{p1, 1 - p1}], Qm[{p1, 1 - p1}]}], {p1, 0, 1},  
PlotTheme -> "myTheme", AxesLabel -> {"p1", it["Q"]}, PlotLegends -> {"Qe", "Qg", "Qm"}
```



```
In[17]:= plotMeasures /. {"Qe" -> it["A"], "Qg" -> it["B"], "Qm" -> it["C"]}
```



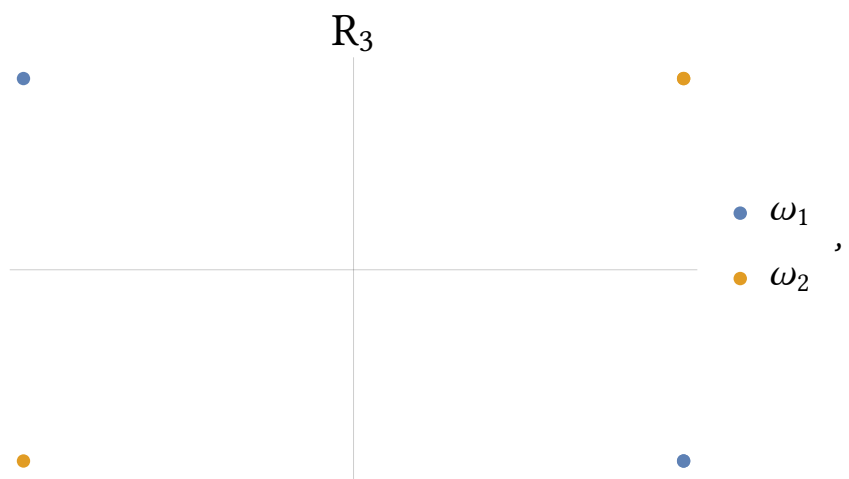
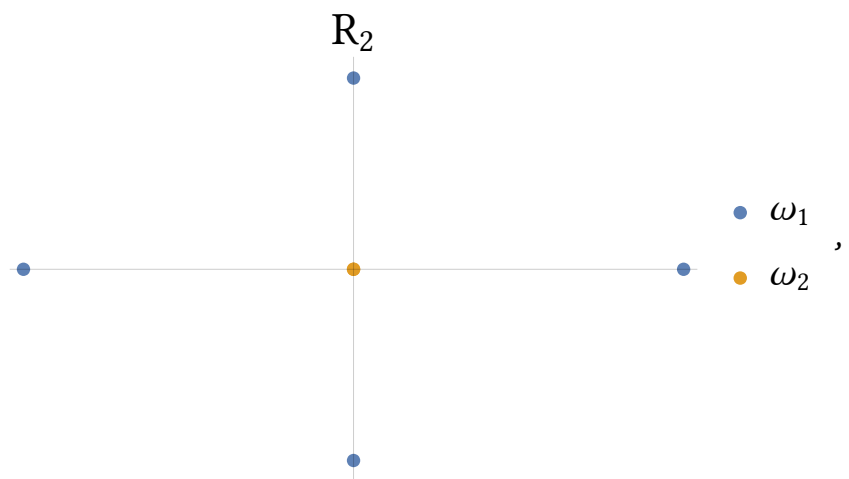
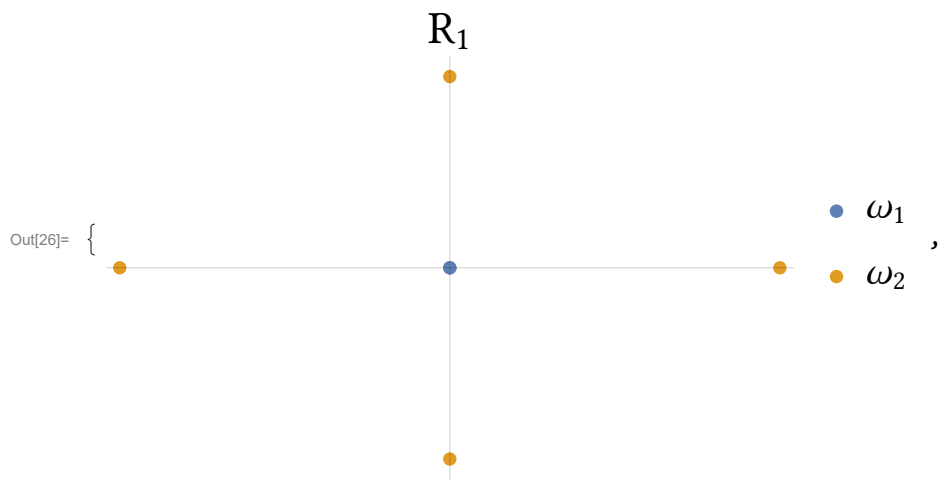
Part 2: Examples

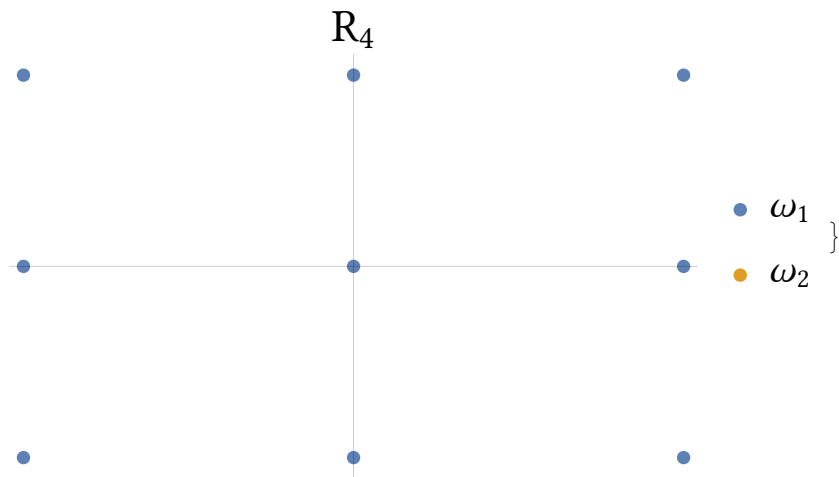
```
In[18]:= R1 = <|"ω1" -> {{0, 0}}, "ω2" -> {{0, 0.5}, {0.5, 0}, {0, -0.5}, {-0.5, 0}}|>;
R2 = <|"ω1" -> {{0, 0.5}, {0.5, 0}, {0, -0.5}, {-0.5, 0}}, "ω2" -> {{0, 0}}|>;
R3 = <|"ω1" -> {{-0.5, 0.5}, {0.5, -0.5}}, "ω2" -> {{-0.5, -0.5}, {0.5, 0.5}}|>;
R4 = <|"ω1" -> {{0, 0}, {0, 0.5}, {0.5, 0.5}, {0.5, 0},
  {0.5, -0.5}, {0, -0.5}, {-0.5, -0.5}, {-0.5, 0}, {-0.5, 0.5}}, "ω2" -> {}|>;
n =
  4;
```

```
In[23]:= plotSets[dataA_, dataB_, title_] :=
  ListPlot[{{ { dataA Length[dataA] > 0, { dataB Length[dataB] > 0 },
    { None True }, { None True } },
    PlotTheme -> "Minimal",
    LabelStyle -> Directive[FontFamily -> "Libertinus Serif", FontSize -> 20],
    AxesStyle -> Opacity[0.2],
    PlotLegends -> {"ω1", "ω2"},
    PlotLabel -> title,
    ImageSize -> Medium
  ]
```

```
In[24]:= plots = ConstantArray[0, n];
Do[
  plots[[i]] = plotSets[Ri["ω1"], Ri["ω2"], Subscript["R", i]]
  , {i, 1, n}]
```

```
In[26]:= Table[plots[[i]], {i, 1, n}]
```





```
In[27]:= (*Do[
  Export[FileNameJoin[{NotebookDirectory[], "Set"<>ToString[p]<>".pdf"}], plots[[p]]]
, {p, 1, Length[plots]}] *)

In[28]:= probR[R_] := {
  Length[R["ω1"]]/
  (Length[R["ω1"]] + Length[R["ω2"]]),
  Length[R["ω2"]]/
  (Length[R["ω1"]] + Length[R["ω2"]])
}

In[29]:= TableForm[
  N@Table[
    {ToString[probR[Ri], StandardForm], Qm[probR[Ri]], Qg[probR[Ri]], Qe[probR[Ri]]}
    , {i, 1, n}],
  TableHeadings -> {
    Table[Subscript["R", i], {i, 1, n}],
    {"p_i", "Q_m(p_i)", "Q_g(p_i)", "Q_e(p_i)"}
  }
]
```

Out[29]//TableForm=

	p _i	Q _m (p _i)	Q _g (p _i)	Q _e (p _i)
R ₁	{1/5, 4/5}	0.2	0.32	0.721928
R ₂	{4/5, 1/5}	0.2	0.32	0.721928
R ₃	{1/2, 1/2}	0.5	0.5	1.
R ₄	{1, 0}	0.	0.	0.