

The Catalan Project

```
(*This is the program fom class*)
ts[n_Integer] := ts[Range[0, n + 1]];
ts[{}, _] = {ds[]};
ts[vs_List] := Module[{l, r, k, t1, t2, tds},
  Union @@ Table[
    l = ts[Prepend[vs[[k];], vs[[1]]];
    r = ts[vs[[2]; k]];
    Flatten[Table[
      tds = Join[t1, t2];
      If[k > 3, AppendTo[tds, d[vs[[2], vs[[k]]]]];
      If[k < Length[vs], AppendTo[tds, d[vs[[1], vs[[k]]]]];
      tds,
      {t1, l}, {t2, r}],
    {k, 3, Length[vs]}
  ]
]
```

Draw all triangulations

```
n = Input["Enter"]
l11 =
  Table[Union[ds @@ Range[0, n + 1] /. j_Integer => d[j, j + 1] /. n + 2 => 0, s], {s, ts[n]};
Manipulate[Multicolumn[l11 /. ds[ls_...] => Graphics[{ls}] /. d[i_, j_] => Line[{i, j}] /.
  j_Integer => {Cos[2 π j / (n + 2)], Sin[2 π j / (n + 2)]},
  Frame -> All, ItemSize -> n], {n, 4, 7, 1}]
```

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Draw a single triangulation

```
poly[tr_ds] := Module[{bb},
  bb = Union[
    ds @@ Range[0, Length[tr] + 2] /. j_Integer => d[j, j + 1] /. Length[tr] + 3 => 0, tr];
  Graphics[List @@ bb] /. d[i_, j_] => Line[{i, j}] /.
    j_Integer => {Cos[2 π j / (Length[tr] + 3)], Sin[2 π j / (Length[tr] + 3)]}
]
```

`poly[ts[3][[1]]]`

