

PS 13 — Rania 3.25.2025

Section 33

In[53]:= (*33.1 Head of output from ListPlot*)

```
Head[ListPlot[Range[10]]]
```

Out[53]=

Graphics

In[54]:= (*33.2*)

```
Times @@ Range[100]
```

Out[54]=

```
93 326 215 443 944 152 681 699 238 856 266 700 490 715 968 264 381 621 468 592 963 895 217 599 993 \
229 915 608 941 463 976 156 518 286 253 697 920 827 223 758 251 185 210 916 864 000 000 000 000 \
000 000 000 000
```

In[55]:= (*33.3 Use @@@ and Tuples to generate {f[a,a],f[a,b],f[b,a],f[b,b]}.*)

```
f @@@ Tuples[{a, b}, 2]
```

Out[55]=

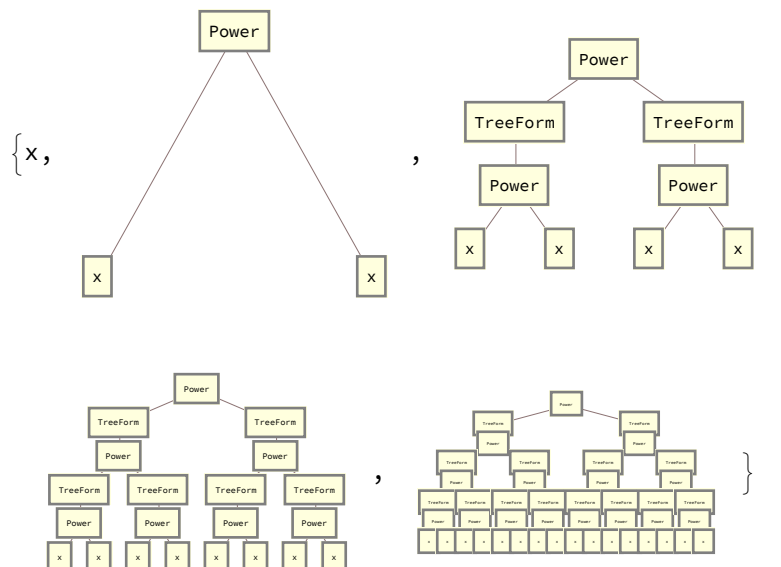
```
{f[a, a], f[a, b], f[b, a], f[b, b]}
```

In[56]:= (*33.4 Make a list of expression trees for the

results of 4 successive applications of #^#& starting from x.*)

```
NestList[TreeForm[#^#] &, x, 4]
```

Out[56]=

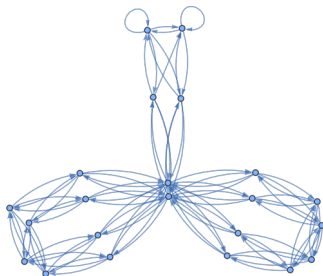


```
In[57]:= (*33.5 Find the unique cases where  $i^2/(j^2+1)$  is an integer,
with i and j going up to 20.*)
Select[Flatten[Table[ $i^2/(j^2+1)$ ], {i, 20}, {j, 20}]], IntegerQ]
```

```
Out[57]:=
{2, 8, 5, 18, 32, 50, 20, 10, 2, 72, 98, 45, 128, 17, 162, 200, 80, 40, 8}
```

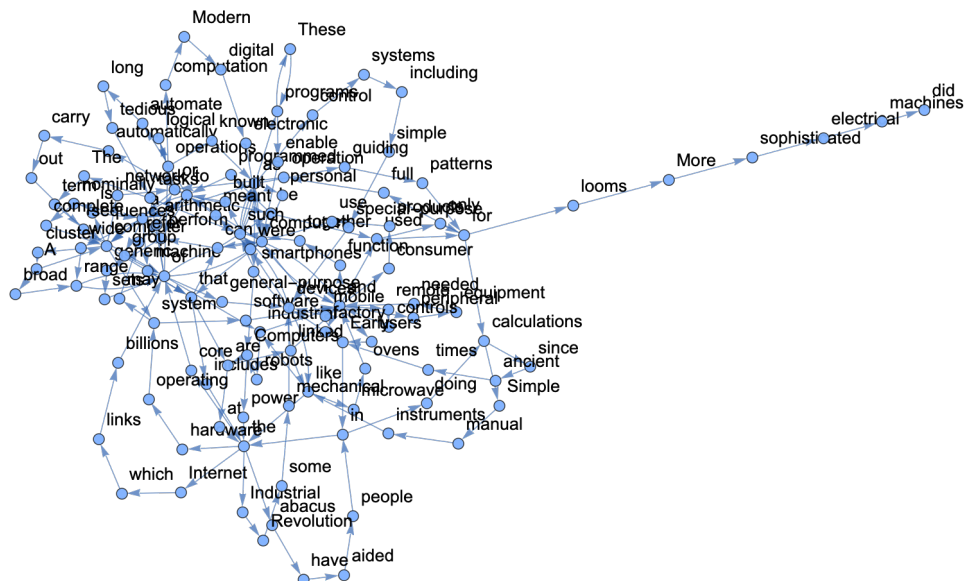
```
In[58]:= (*33.6 Create a graph that connects successive
pairs of numbers in Table[Mod[ $n^2+n$ ,100],{n,100}]*)
Graph[Rule @@@ Partition[Table[Mod[ $n^2+n$ , 100], {n, 100}], 2, 1]]
```

```
Out[58]=
```



```
In[59]:= (*33.7 Generate a graph showing which word can follow which
in the first 200 words of the Wikipedia article on computers.*)
Graph[Rule @@@ Partition[Take[TextWords[WikipediaData["computers"]], 200], 2, 1],
VertexLabels -> All]
```

```
Out[59]=
```



```
In[60]:= (*33.8 Find a simpler form for f@@#&/@{{1,2},{7,2},{5,4}}.*)
f@@ #& /@ {{1, 2}, {7, 2}, {5, 4}}
f @@@ {{1, 2}, {7, 2}, {5, 4}}
```

```
Out[60]:=
{f[1, 2], f[7, 2], f[5, 4]}
```

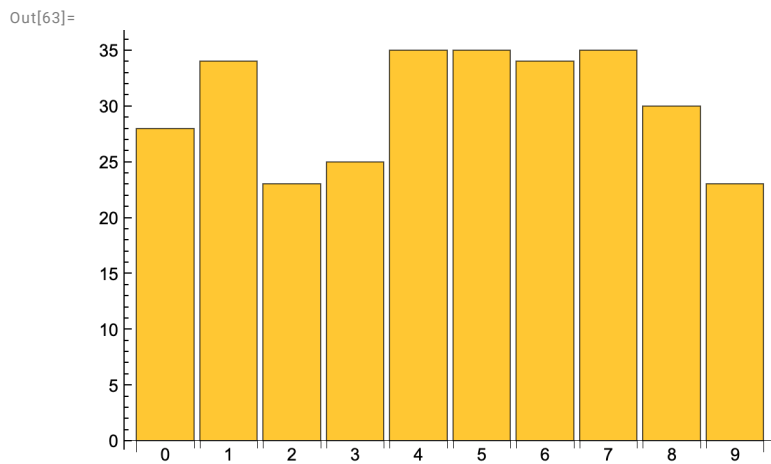
```
Out[61]:=
{f[1, 2], f[7, 2], f[5, 4]}
```

Section 34

```
In[62]:= (*34.1 Make a list, in order,
of the number of times each of the digits 0 through 9 occurs in 3^100*)
Values[KeyTake[Counts[IntegerDigits[3^100]], Range[10] - 1]]
```

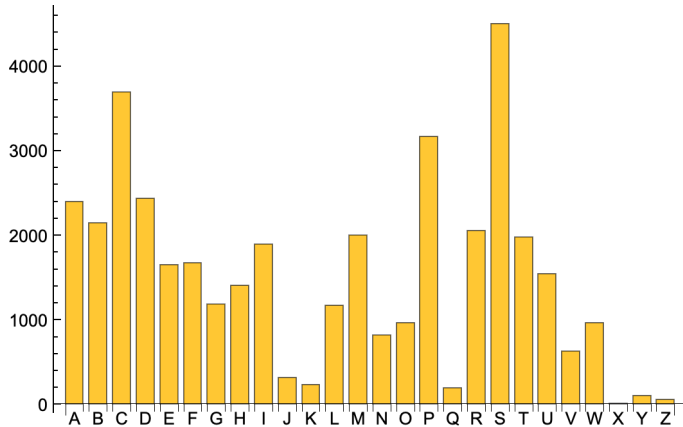
```
Out[62]:=
{7, 9, 9, 5, 1, 5, 4, 7, 1}
```

```
In[63]:= (*34.2 Make a labeled bar chart of the number of
times each of the digits 0 through 9 occurs in 2^1000 *)
BarChart[KeyTake[Counts[IntegerDigits[2^1000]], Range[10] - 1],
ChartLabels -> Automatic]
```



```
In[64]:= (*34.3 Make a labeled bar chart of the number of times each possible first
letter occurs in words from WordList[], with all letters made uppercase*)
BarChart[Counts[First /@ Characters /@ ToUpperCase /@ WordList[]],
ChartLabels -> Automatic]
```

Out[64]=



```
In[65]:= (*34.4 Make an association giving the 5 most common
first letters of words in WordList[] and their counts.**)
Reverse[Sort[Counts[First /@ Characters /@ WordList[]]]][1 ;; 5]
```

Out[65]=

```
<|s -> 4499, c -> 3693, p -> 3168, d -> 2433, a -> 2393|>
```

```
In[66]:= (*34.5 Find the numerical ratio of the number of occurrences
of "q" and "u" in the Wikipedia entry for computers.**)
Counts[Flatten[Characters /@ TextWords[ WikipediaData["computers"]]]][["q"]] /
Counts[Flatten[Characters /@ TextWords[ WikipediaData["computers"]]]][["u"]] // N

(*#q/#e&@Counts[Flatten[Characters/@TextWords[ WikipediaData["computers"]]]]//N*)
```

Out[66]=

```
0.0401274
```

```
In[67]:= (*34.6 Find the 10 most common words in ExampleData[{"Text","AliceInWonderland"}]*)
```

```
In[68]:= Reverse[Sort[Counts[TextWords[ExampleData[{"Text", "AliceInWonderland"}]]]]][
1 ;; 10] // Keys
```

Out[68]=

```
{the, and, a, to, she, of, was, Alice, in, it}
```