# Brian — PS 13 — 2025-03-25 — Solution

*EIWL3* Sections 33 and 34

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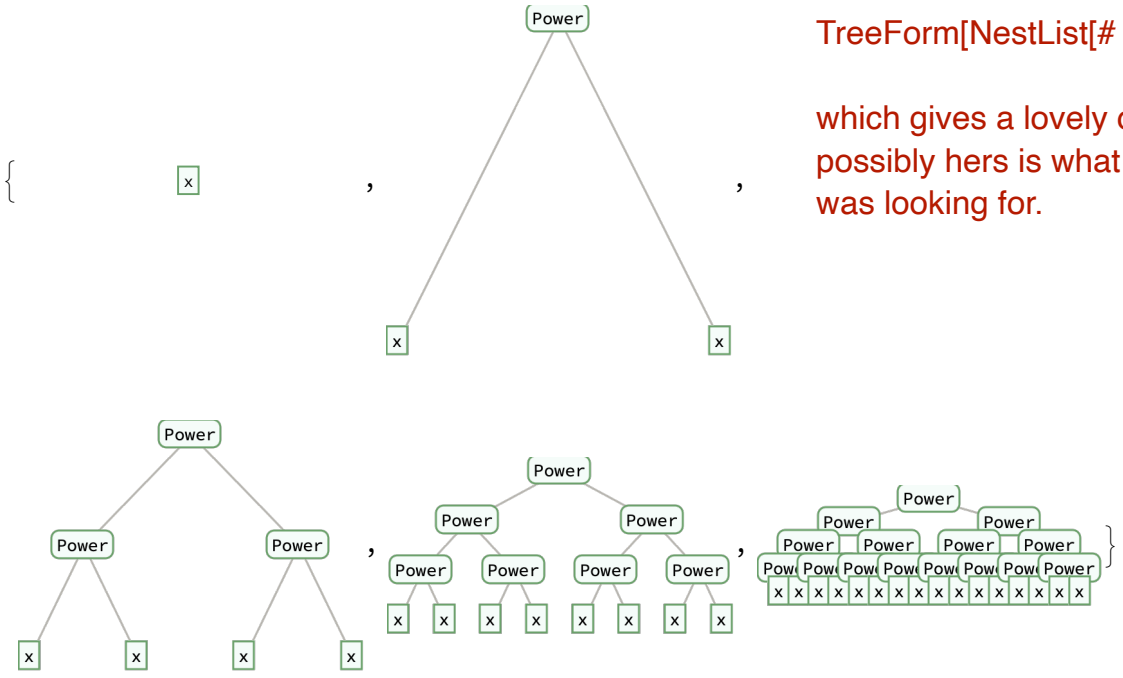
## Exercises from *EIWL3* Section 33

```
In[•]:= (* 33.1 *) Head[ListPlot[{1, 2, 3}]]
Out[•]=
Graphics

In[•]:= (* 33.2 *) Times @@ Array[# &, 100]
Out[•]=
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[•]:= (* 33.3 *) f @@@ Tuples[{a, b}, 2]
Out[•]=
{f[a, a], f[a, b], f[b, a], f[b, b]}

In[•]:= (* 33.4 *) ExpressionTree /@ NestList[# ^ # &, x, 4]
Out[•]=
```




Hexi did

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

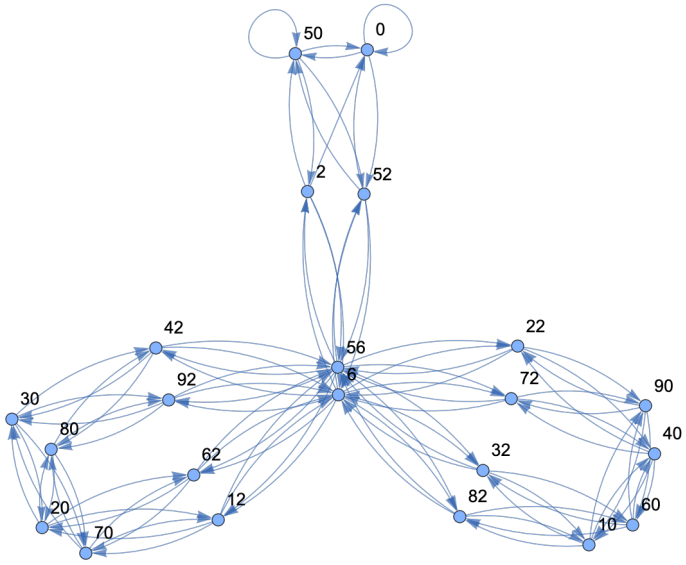
which gives a lovely display. Quite possibly hers is what Wolfram was looking for.

In[•]:=
```
(* 33.5 *) Union[Select[Flatten[Array[#1^2 / (#2^2 + 1) &, {20, 20}]], IntegerQ]]
```

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

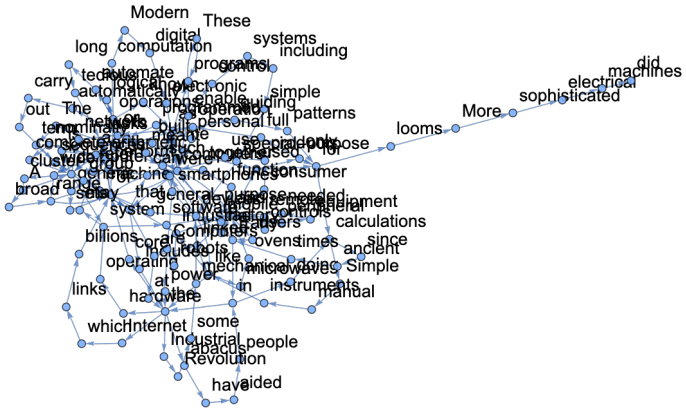
In[•]:=
```
(* 33.6 *)
Graph[Rule @@@ Partition[Table[Mod[n^2 + n, 100], {n, 100}], 2, 1], VertexLabels → All]
```

Out[•]=




In[•]:=
```
(* 33.7 *)
Graph[Rule @@@ Partition[Take[TextWords[WikipediaData["computers"]], 200], 2, 1],
 VertexLabels → All]
```

Out[•]=




In[•]:=
```
(* 33.8 *) f @@@ {{1, 2}, {7, 2}, {5, 4}}
```

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

yields the same result as the more complicated

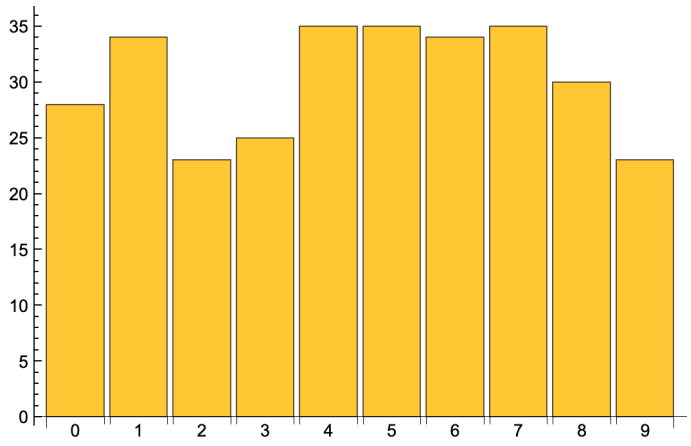
```
In[•]:= f @@ # & /@ {{1, 2}, {7, 2}, {5, 4}}
Out[•]=
{f[1, 2], f[7, 2], f[5, 4]}
```

# Exercises from *EIWL3* Section 34

```
In[•]:= (* 34.1 *) Count[IntegerDigits[3^100], #] & /@ Table[i, {i, 0, 9}]
Out[•]=
{7, 9, 9, 5, 1, 5, 4, 7, 0, 1}
```

I think Wolfram's expected output for Exercise 34.1 is wrong. He fails to include that 8 appears 0 times. His notebook says the expected output is {7,9,9,5,1,5,4,7,1}.

```
In[•]:= (* 34.2 *)
BarChart[Association[# → Count[IntegerDigits[2^1000], #] & /@ Table[i, {i, 0, 9}]],
 ChartLabels → Table[i, {i, 0, 9}]]
Out[•]=
```



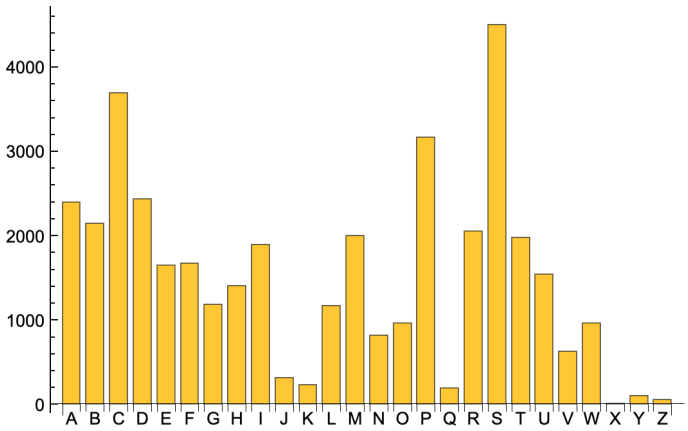

My solution to Exercise 34.2 is a little clunky. Got a better one?

Walker's is better than mine!

BarChart[Counts[Sort[IntegerDigits[2 ^ 1000]]], ChartLabels → Automatic]

In[ ]:=
```
(* 34.3 *)
BarChart[Table[Count[Capitalize[First[Characters[#]]] & /@ WordList[], letter],
  {letter, Capitalize /@ Alphabet[]}], ChartLabels → Capitalize /@ Alphabet[]]
```

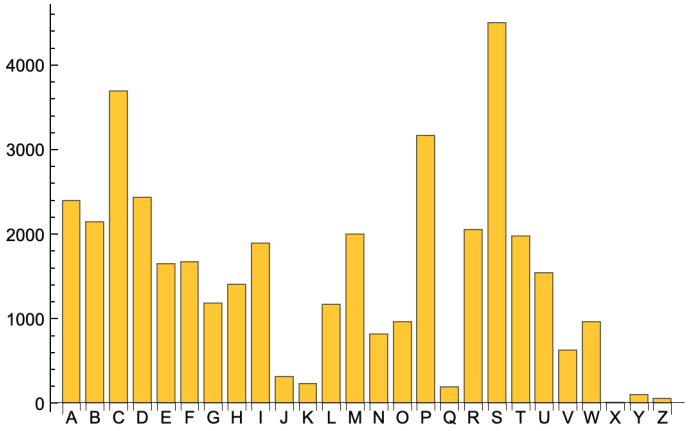
Out[ ]=




Same comment about my solution to Exercise 34.3 as 34.2. I'm guessing there is a slicker way to do these two using associations. In Exercise 34.4 I finally figured out the slicker way.

In[ ]:=
```
(* 34.4 *)BarChart[Association[
  Table[letter → Count[Capitalize[First[Characters[#]]] & /@ WordList[], letter],
   {letter, Capitalize /@ Alphabet[]}]], ChartLabels → Automatic]
```

Out[ ]=




In[ ]:=
```
(* 34.5 *)Count[Characters[WikipediaData["computers"]], #] & /@ {"q", "u"} //
 Divide[#[[1]], #[[2]]] &
```

Out[ ]=

$$\frac{63}{1570}$$

My solution to Exercise 34.5 is super-clunky. I may revise this solution after I look at yours :).

In[ ]:=
```
(* 34.6 *)Keys[
 Take[Reverse[Sort[WordCounts[ExampleData[{"Text", "AliceInWonderland"}]]]], 10]]
```

Out[ ]=

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