Brian — PS 12 — 2025-03-21 — Solution

EIWL3 Sections 31 and 32

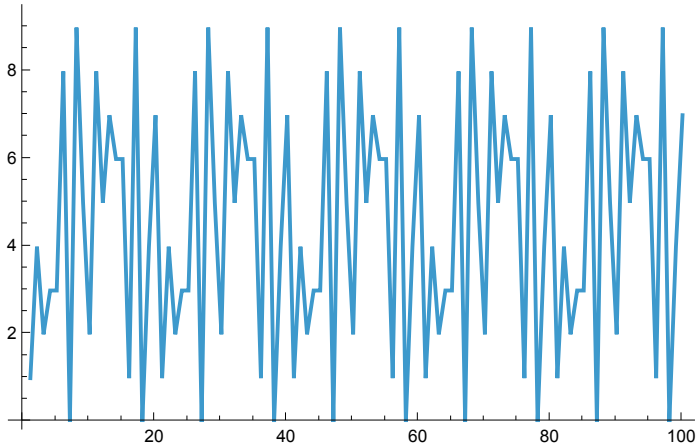
Exercises from *EIWL3* Section 31

In[565]:=
```
(* 31.1 *)Take[ IntegerDigits[2^1000], -5]
```
Out[565]=
```
{6, 9, 3, 7, 6}
```

In[566]:=
```
(* 31.2 *) Alphabet[][[10 ;; 20]]
```
Out[566]=
```
{j, k, l, m, n, o, p, q, r, s, t}
```

In[567]:=
```
(* 31.3 *) Alphabet[][[2 Range[13]]]
(* I don't like the fact that I have hard-coded 13 *)
```
Out[567]=
```
{b, d, f, h, j, l, n, p, r, t, v, x, z}
```

In[568]:=
```
(* 31.4 *) ListLinePlot[IntegerDigits[12^#][[-2]] & /@ Range[100]]
```
Out[568]=

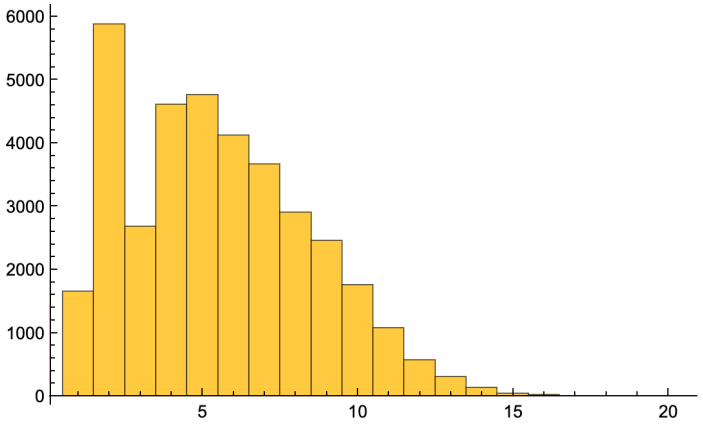


In[569]:=
```
(* 31.5 *) TakeSmallest[Join[Array[#^2 &, 20], Array[#^3 &, 20]], 10]
```
Out[569]=
```
{1, 1, 4, 8, 9, 16, 25, 27, 36, 49}
```

In[570]:=
```
(* 31.6 *) Position[ TextWords[WikipediaData["computers"]], "software"]
```
Out[570]=
```
{{62}, {6124}, {6218}, {6240}, {6980}, {7002},
 {7005}, {7009}, {7023}, {8226}, {8327}, {8334}, {8342}, {8364}}
```

In[571]:=
```
(* The above is marked wrong by Mathematica's exercise checker,
and that is because *)
(* Position returns each position in
 its own little list. So you need a Flatten[]. *)
Flatten[Position[ TextWords[WikipediaData["computers"]], "software"]]
```
Out[571]=
```
{62, 6124, 6218, 6240, 6980, 7002, 7005, 7009, 7023, 8226, 8327, 8334, 8342, 8364}
```

In[572]:=
```
(* 31.7 *) Histogram[Position[Characters[#] & /@ WordList[], "e"][[All, 2]]]
```
Out[572]=



In[573]:=
```
(* 31.8 *) If[IntegerQ[Sqrt[#]], Red, #] & /@ Array[#^3 &, 100]
```
Out[573]=
```
{■, 8, 27, ■, 125, 216, 343, 512, ■, 1000, 1331, 1728, 2197, 2744, 3375, ■, 4913, 5832,
 6859, 8000, 9261, 10 648, 12 167, 13 824, ■, 17 576, 19 683, 21 952, 24 389, 27 000,
 29 791, 32 768, 35 937, 39 304, 42 875, ■, 50 653, 54 872, 59 319, 64 000, 68 921,
 74 088, 79 507, 85 184, 91 125, 97 336, 103 823, 110 592, ■, 125 000, 132 651, 140 608,
 148 877, 157 464, 166 375, 175 616, 185 193, 195 112, 205 379, 216 000, 226 981,
 238 328, 250 047, ■, 274 625, 287 496, 300 763, 314 432, 328 509, 343 000, 357 911,
 373 248, 389 017, 405 224, 421 875, 438 976, 456 533, 474 552, 493 039, 512 000, ■,
 551 368, 571 787, 592 704, 614 125, 636 056, 658 503, 681 472, 704 969, 729 000,
 753 571, 778 688, 804 357, 830 584, 857 375, 884 736, 912 673, 941 192, 970 299, ■}
```

In[574]:=
```
(* 31.9 *) If[First[IntegerDigits[#]] < 5, Nothing, #] & /@ Array[Prime, 100]
```
Out[574]=
```
{5, 7, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97, 503, 509, 521, 523, 541}
```

In[575]:=
```
(* 31.10 *) NestList[Drop[#, {RandomInteger[{1, Length[#]}]}] &, Range[10], 9] // Grid
```
Out[575]=
```
1 2 3 4 5  6  7  8  9 10
1 2 3 4 6  7  8  9 10
1 2 3 4 6  8  9 10
2 3 4 6 8  9 10
2 3 4 6 9 10
2 4 6 9 10
2 4 6 9
2 6 9
2 9
2
```

In[576]:=
```
(* 31.11 *) TakeLargestBy[ WordList[], StringLength, 10]
```
Out[576]=
```
{electroencephalographic, electroencephalograph,
 buckminsterfullerene, compartmentalization,
 counterrevolutionary, electroencephalogram, internationalization,
 magnetohydrodynamics, uncharacteristically, counterintelligence}
```

In[577]:=
```
(* 31.12 *) TakeLargestBy[ Array[IntegerName, 100], StringLength, 10]
```
Out[577]=
```
{seventy-three, seventy-seven, seventy-eight, twenty-three, twenty-seven,
 twenty-eight, thirty-three, thirty-seven, thirty-eight, seventy-four}
```

In[578]:=
```
Position[Characters["banana"], "a"]
```
Out[578]=
```
{{2}, {4}, {6}}
```

In[579]:=
```
(* 31.13 *) TakeLargestBy[ Array[IntegerName, 100],
 Length[Position[Characters[#], "e"]] &, 5]
```
Out[579]=
```
{seventeen, seventy-three, seventy-seven, eleven, eighteen}
```

Exercises from *EIWL3* Section 32

In[580]:=
```
(* 32.1 *) Cases[IntegerDigits[Range[1000]], {1, __, 9}]
(* Technically, you should use __ not _, but it doesn't *)
(* actually matter because the range wasn't large enough. *)
```
Out[580]=
```
{{1, 0, 9}, {1, 1, 9}, {1, 2, 9}, {1, 3, 9},
 {1, 4, 9}, {1, 5, 9}, {1, 6, 9}, {1, 7, 9}, {1, 8, 9}, {1, 9, 9}}
```

In[581]:=
```
(* 32.2 *) Cases[IntegerDigits[Range[1000]], {x_, x_, x_}]
```
Out[581]=
```
{{1, 1, 1}, {2, 2, 2}, {3, 3, 3}, {4, 4, 4},
 {5, 5, 5}, {6, 6, 6}, {7, 7, 7}, {8, 8, 8}, {9, 9, 9}}
```

In[582]:=
```
(* 32.3 *) Cases[IntegerDigits[Range[1000]^2], {9, __, 0 | 1}]
```
Out[582]=
```
{{9, 0, 0}, {9, 6, 1}, {9, 8, 0, 1}, {9, 0, 0, 0, 0},
 {9, 0, 6, 0, 1}, {9, 5, 4, 8, 1}, {9, 6, 1, 0, 0}, {9, 6, 7, 2, 1},
 {9, 0, 0, 6, 0, 1}, {9, 0, 2, 5, 0, 0}, {9, 0, 4, 4, 0, 1}, {9, 1, 9, 6, 8, 1},
 {9, 2, 1, 6, 0, 0}, {9, 2, 3, 5, 2, 1}, {9, 3, 8, 9, 6, 1}, {9, 4, 0, 9, 0, 0},
 {9, 4, 2, 8, 4, 1}, {9, 5, 8, 4, 4, 1}, {9, 6, 0, 4, 0, 0}, {9, 6, 2, 3, 6, 1},
 {9, 7, 8, 1, 2, 1}, {9, 8, 0, 1, 0, 0}, {9, 8, 2, 0, 8, 1}, {9, 9, 8, 0, 0, 1}}
```

In[583]:=
```
(* 32.4 *) IntegerDigits[Range[100]] /. {0 → Gray, 9 → Orange}
```
Out[583]=
```
{{1}, {2}, {3}, {4}, {5}, {6}, {7}, {8}, {■}, {1, ■}, {1, 1}, {1, 2}, {1, 3},
 {1, 4}, {1, 5}, {1, 6}, {1, 7}, {1, 8}, {1, ■}, {2, ■}, {2, 1}, {2, 2},
 {2, 3}, {2, 4}, {2, 5}, {2, 6}, {2, 7}, {2, 8}, {2, ■}, {3, ■}, {3, 1}, {3, 2},
 {3, 3}, {3, 4}, {3, 5}, {3, 6}, {3, 7}, {3, 8}, {3, ■}, {4, ■}, {4, 1}, {4, 2},
 {4, 3}, {4, 4}, {4, 5}, {4, 6}, {4, 7}, {4, 8}, {4, ■}, {5, ■}, {5, 1}, {5, 2},
 {5, 3}, {5, 4}, {5, 5}, {5, 6}, {5, 7}, {5, 8}, {5, ■}, {6, ■}, {6, 1}, {6, 2},
 {6, 3}, {6, 4}, {6, 5}, {6, 6}, {6, 7}, {6, 8}, {6, ■}, {7, ■}, {7, 1}, {7, 2},
 {7, 3}, {7, 4}, {7, 5}, {7, 6}, {7, 7}, {7, 8}, {7, ■}, {8, ■}, {8, 1}, {8, 2},
 {8, 3}, {8, 4}, {8, 5}, {8, 6}, {8, 7}, {8, 8}, {8, ■}, {■, ■}, {■, 1},
 {■, 2}, {■, 3}, {■, 4}, {■, 5}, {■, 6}, {■, 7}, {■, 8}, {■, ■}, {1, ■, ■}}
```

In[584]:=
```
(* 32.5 *) IntegerDigits[2^1000] /. 0 → Red
```
Out[584]=
```
{1, ■, 7, 1, 5, ■, 8, 6, ■, 7, 1, 8, 6, 2, 6, 7, 3, 2, ■, 9, 4, 8, 4, 2, 5, ■, 4, 9,
 ■, 6, ■, ■, ■, 1, 8, 1, ■, 5, 6, 1, 4, ■, 4, 8, 1, 1, 7, ■, 5, 5, 3, 3, 6, ■,
 7, 4, 4, 3, 7, 5, ■, 3, 8, 8, 3, 7, ■, 3, 5, 1, ■, 5, 1, 1, 2, 4, 9, 3, 6, 1, 2,
 2, 4, 9, 3, 1, 9, 8, 3, 7, 8, 8, 1, 5, 6, 9, 5, 8, 5, 8, 1, 2, 7, 5, 9, 4, 6, 7, 2,
 9, 1, 7, 5, 5, 3, 1, 4, 6, 8, 2, 5, 1, 8, 7, 1, 4, 5, 2, 8, 5, 6, 9, 2, 3, 1, 4, ■,
 4, 3, 5, 9, 8, 4, 5, 7, 7, 5, 7, 4, 6, 9, 8, 5, 7, 4, 8, ■, 3, 9, 3, 4, 5, 6, 7, 7,
 7, 4, 8, 2, 4, 2, 3, ■, 9, 8, 5, 4, 2, 1, ■, 7, 4, 6, ■, 5, ■, 6, 2, 3, 7, 1, 1,
 4, 1, 8, 7, 7, 9, 5, 4, 1, 8, 2, 1, 5, 3, ■, 4, 6, 4, 7, 4, 9, 8, 3, 5, 8, 1, 9, 4,
 1, 2, 6, 7, 3, 9, 8, 7, 6, 7, 5, 5, 9, 1, 6, 5, 5, 4, 3, 9, 4, 6, ■, 7, 7, ■, 6,
 2, 9, 1, 4, 5, 7, 1, 1, 9, 6, 4, 7, 7, 6, 8, 6, 5, 4, 2, 1, 6, 7, 6, 6, ■, 4, 2, 9,
 8, 3, 1, 6, 5, 2, 6, 2, 4, 3, 8, 6, 8, 3, 7, 2, ■, 5, 6, 6, 8, ■, 6, 9, 3, 7, 6}
```

In[585]:=
```
(* 32.6 *) Characters["The Wolfram Language"] /. "a" | "e" | "i" | "o" | "u" → Nothing
```
Out[585]=
```
{T, h,  , W, l, f, r, m,  , L, n, g, g}
```

In[586]:=
```
(* 32.7 *) Cases[IntegerDigits[2^1000], 0 | 1]
```
Out[586]=
```
{1, 0, 1, 0, 0, 1, 0, 0, 0, 0, 0, 0, 1, 1, 0, 1, 0, 1, 1, 0, 0, 0, 0, 1, 0, 1, 1, 1, 1, 1, 1,
 1, 1, 1, 1, 1, 0, 0, 0, 1, 0, 0, 0, 1, 1, 1, 1, 1, 0, 1, 1, 1, 0, 0, 1, 1, 1, 1, 0, 1, 0, 0}
```

In[587]:=
```
(* 32.8 *) Cases[IntegerDigits[Range[100, 999]], {x_, _, x_}]
```
Out[587]=
```
{{1, 0, 1}, {1, 1, 1}, {1, 2, 1}, {1, 3, 1}, {1, 4, 1}, {1, 5, 1}, {1, 6, 1}, {1, 7, 1},
 {1, 8, 1}, {1, 9, 1}, {2, 0, 2}, {2, 1, 2}, {2, 2, 2}, {2, 3, 2}, {2, 4, 2}, {2, 5, 2},
 {2, 6, 2}, {2, 7, 2}, {2, 8, 2}, {2, 9, 2}, {3, 0, 3}, {3, 1, 3}, {3, 2, 3}, {3, 3, 3},
 {3, 4, 3}, {3, 5, 3}, {3, 6, 3}, {3, 7, 3}, {3, 8, 3}, {3, 9, 3}, {4, 0, 4}, {4, 1, 4},
 {4, 2, 4}, {4, 3, 4}, {4, 4, 4}, {4, 5, 4}, {4, 6, 4}, {4, 7, 4}, {4, 8, 4}, {4, 9, 4},
 {5, 0, 5}, {5, 1, 5}, {5, 2, 5}, {5, 3, 5}, {5, 4, 5}, {5, 5, 5}, {5, 6, 5}, {5, 7, 5},
 {5, 8, 5}, {5, 9, 5}, {6, 0, 6}, {6, 1, 6}, {6, 2, 6}, {6, 3, 6}, {6, 4, 6},
 {6, 5, 6}, {6, 6, 6}, {6, 7, 6}, {6, 8, 6}, {6, 9, 6}, {7, 0, 7}, {7, 1, 7},
 {7, 2, 7}, {7, 3, 7}, {7, 4, 7}, {7, 5, 7}, {7, 6, 7}, {7, 7, 7}, {7, 8, 7},
 {7, 9, 7}, {8, 0, 8}, {8, 1, 8}, {8, 2, 8}, {8, 3, 8}, {8, 4, 8}, {8, 5, 8},
 {8, 6, 8}, {8, 7, 8}, {8, 8, 8}, {8, 9, 8}, {9, 0, 9}, {9, 1, 9}, {9, 2, 9},
 {9, 3, 9}, {9, 4, 9}, {9, 5, 9}, {9, 6, 9}, {9, 7, 9}, {9, 8, 9}, {9, 9, 9}}
```