Brian — PS 21 — 2025-04-25 — Solution

EIWL3 Sections 47 and 48

Exercises from *EIWL3* Section 47

In[39]:=
```
(* 47.1 *) Total[Array[# (# + 1) &, 1000]]
```

Out[39]=

334 334 000

In[40]:=
```
(* 47.2 *) Nest[1/(1 + #) &, x, 10]
```

Out[40]=

$$\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+x}}}}}}}}}}$$

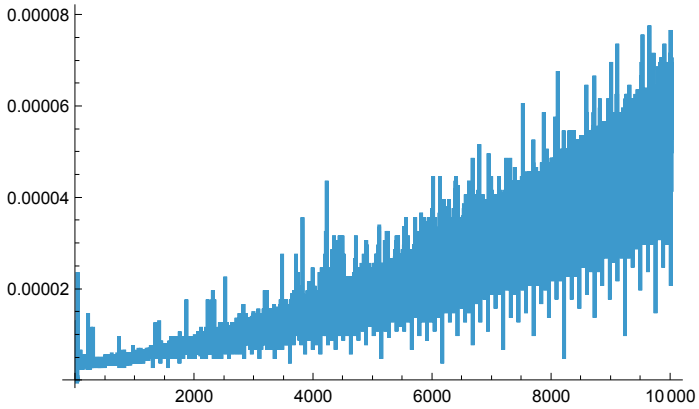
In[41]:=
```
(* 47.3 *) Flatten[Array[{#1, #2} &, {10, 10}]]
```

Out[41]=

```
{1, 1, 1, 2, 1, 3, 1, 4, 1, 5, 1, 6, 1, 7, 1, 8, 1, 9, 1, 10, 2, 1, 2, 2, 2, 3, 2, 4, 2, 5, 2,
 6, 2, 7, 2, 8, 2, 9, 2, 10, 3, 1, 3, 2, 3, 3, 3, 4, 3, 5, 3, 6, 3, 7, 3, 8, 3, 9, 3, 10,
 4, 1, 4, 2, 4, 3, 4, 4, 4, 5, 4, 6, 4, 7, 4, 8, 4, 9, 4, 10, 5, 1, 5, 2, 5, 3, 5, 4, 5,
 5, 5, 6, 5, 7, 5, 8, 5, 9, 5, 10, 6, 1, 6, 2, 6, 3, 6, 4, 6, 5, 6, 6, 6, 7, 6, 8, 6, 9,
 6, 10, 7, 1, 7, 2, 7, 3, 7, 4, 7, 5, 7, 6, 7, 7, 7, 8, 7, 9, 7, 10, 8, 1, 8, 2, 8, 3,
 8, 4, 8, 5, 8, 6, 8, 7, 8, 8, 8, 9, 8, 10, 9, 1, 9, 2, 9, 3, 9, 4, 9, 5, 9, 6, 9, 7, 9,
 8, 9, 9, 9, 10, 10, 1, 10, 2, 10, 3, 10, 4, 10, 5, 10, 6, 10, 7, 10, 8, 10, 9, 10, 10}
```

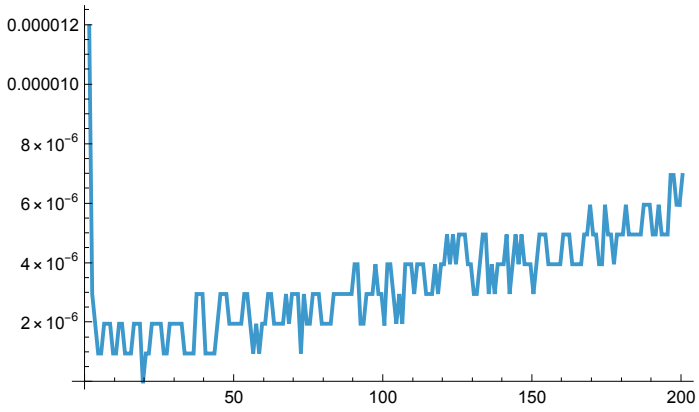
In[42]:=
```
(* 47.4 *) ListLinePlot[Array[{#, Timing[#^#][[1]]} &, 10 000]]
```

Out[42]=



In[43]:=
```
(* 47.5 *)
ListLinePlot[Array[{#, Timing[Sort[RandomSample[Range[#], #]]][[1]]} &, 200]]
```

Out[43]=



In[44]:=

Exercises from *EIWL3* Section 48

```
(* 48.1 *) (* Correct this code: *)
(* Counts[StringTake[#,2]&/@WordList[]]*)
(* Counts[StringTake[#,Min[2,StringLength[#]]]&/@WordList[]] *)
(* or, if you aren't interested in the one-letter cases, *)
Counts[StringTake[#, 2] & /@ Select[WordList[], StringLength[#] ≥ 2 &]]
```

Out[49]=

```
⟨| aa → 2, ab → 170, ac → 217, ad → 191, ae → 26, af → 72, ag → 81, ah → 5, ai → 55, AI → 1,
 aj → 1, ak → 2, al → 204, am → 139, an → 330, ao → 3, ap → 165, Ap → 1, aq → 14,
 ar → 207, as → 198, AS → 1, at → 99, au → 117, Au → 1, av → 46, aw → 30, ax → 12,
 ay → 2, az → 4, ba → 448, BA → 1, be → 359, bi → 208, bl → 254, bo → 302, br → 306,
 bu → 255, by → 14, ca → 612, ce → 126, ch → 442, ci → 89, cl → 265, cn → 1, co → 1589,
 CO → 1, cr → 337, cu → 184, cy → 45, cz → 3, da → 152, dB → 1, de → 884, De → 1, dh → 2,
 di → 827, DN → 1, do → 244, DO → 1, dr → 172, du → 113, dw → 9, dy → 29, ea → 72,
 eb → 7, ec → 45, ed → 39, ee → 4, e' → 2, ef → 45, eg → 28, eh → 1, ei → 16, ej → 3,
 el → 136, em → 144, en → 316, eo → 1, ep → 53, eq → 41, er → 56, es → 63, et → 42,
 eu → 25, ev → 76, ew → 2, ex → 416, ey → 21, fa → 276, fe → 174, Fe → 1, fi → 251,
 fj → 1, fl → 266, fo → 335, FO → 1, fr → 228, Fr → 1, fu → 138, ga → 193, ge → 153,
 gh → 15, gi → 65, gl → 136, gn → 13, go → 124, Go → 1, gr → 347, gu → 120, gy → 19,
 ha → 363, he → 321, hi → 127, HI → 1, h' → 1, hm → 1, ho → 340, hu → 134, hy → 116,
 ia → 4, ib → 4, ic → 27, id → 55, if → 2, ig → 18, il → 54, im → 324, in → 1244, io → 10,
 ip → 1, IQ → 1, ir → 90, is → 36, it → 17, iv → 3, ja → 72, Ja → 1, je → 47, ji → 32,
 jo → 76, ju → 86, Ju → 2, ka → 20, kc → 1, ke → 40, kh → 3, kH → 1, ki → 88, kl → 4,
 kn → 51, ko → 10, kp → 1, kr → 5, ku → 3, kv → 1, kW → 1, la → 301, le → 224, li → 293,
 ll → 2, lo → 226, lu → 102, ly → 20, ma → 589, Ma → 2, me → 363, mi → 409, mn → 2,
 mo → 392, Mo → 1, ms → 1, mu → 206, my → 33, na → 129, ne → 208, ni → 87, no → 304,
 No → 1, nt → 1, nu → 86, ny → 4, oa → 15, ob → 126, oc → 46, o' → 2, Oc → 1, od → 19,
 oe → 2, of → 47, og → 3, oh → 5, oi → 12, ok → 3, ol → 20, om → 19, on → 34, oo → 7,
 op → 86, or → 114, os → 28, ot → 7, ou → 125, ov → 215, ow → 11, ox → 19, oy → 1,
 oz → 1, pa → 553, pe → 487, pf → 1, pH → 1, ph → 160, pi → 217, pl → 228, pn → 4,
 po → 402, pr → 815, ps → 50, pt → 3, pu → 225, py → 22, qu → 194, ra → 307, re → 1228,
 rh → 39, ri → 148, ro → 206, ru → 122, ry → 1, sa → 321, Sa → 1, sc → 334, se → 552,
 Se → 1, sh → 377, si → 241, sk → 94, sl → 196, sm → 77, sn → 115, so → 300, sp → 400,
 sq → 56, st → 697, su → 519, Su → 1, sv → 1, sw → 119, sy → 100, ta → 270, te → 313,
 th → 283, Th → 1, ti → 167, TN → 1, to → 253, tr → 476, ts → 3, tu → 119, Tu → 1,
 TV → 1, tw → 49, ty → 42, ub → 2, ud → 1, UF → 1, ug → 3, uk → 2, ul → 24, um → 14,
 un → 1335, UN → 1, up → 75, ur → 36, us → 25, ut → 18, uv → 2, ux → 1, va → 143,
 ve → 170, vi → 214, VI → 1, vo → 84, vu → 15, wa → 252, we → 127, We → 1, wh → 165,
 wi → 186, wo → 166, wr → 68, xe → 6, xi → 1, xy → 3, ya → 26, ye → 36, yi → 6, yo → 27,
 yt → 2, yu → 7, za → 3, ze → 19, zi → 15, zl → 1, zo → 13, zu → 1, zw → 1, zy → 3 |⟩
```

In[48]:=
```
(* 48.2 *) (* Use Sow and Reap to find intermediate *)
(* values of #1 in Fold[10#1+#2&,{1,2,3,4,5}] *)
Reap[Fold[10 Sow[#1] + #2 &, {1, 2, 3, 4, 5}]][[2]][[1]]
```

Out[48]=
```
{1, 12, 123, 1234}
```

In[58]:=
```
(* 48.3 *) Reap[Nest[If[EvenQ[#], (Sow[#]; # / 2), 3 # + 1] &, 1000, 20]][[2]][[1]]
```

Out[58]=
```
{1000, 500, 250, 376, 188, 94, 142, 214, 322, 484, 242, 364, 182}
```