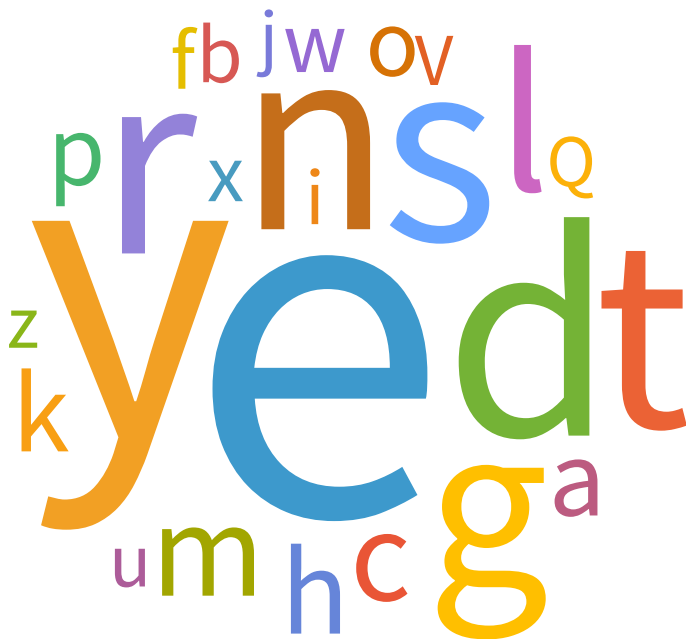


Harper — PS 4 — 2025-01-29

Sections 11-13

Section 11 (11.16-11.31)

```
In[187]:= WordCloud[StringTake[StringReverse[WordList[]], 1]]  
Out[187]=
```



```
In[188]:= RomanNumeral[1959]  
Out[188]= MCMLIX  
  
In[189]:= Max[Table[StringLength[RomanNumeral[n]], {n, 1, 2020}]]  
Out[189]= 13
```

Very nice. 10/10

Please see one important comment on p. 3 which could be a source of errors in future problems involving random numbers.

In[190]:=

```
WordCloud[Table[StringTake[RomanNumeral[n], 1], {n, 100}]]
```

Out[190]=



Somewhat slicker way to do same thing is:

```
WordCloud[StringTake[RomanNumeral[Range[100]], 1]]
```

In[191]:=

```
Length[Alphabet["Russian"]]
```

Out[191]=

33

In[192]:=

```
ToUpperCase[Alphabet["Russian"]]
```

Out[192]=

```
{A, Б, В, Г, Д, Е, Ё, Ж, З, И, Й, К, Л, М,  
H, O, П, Р, С, Т, У, Ф, Х, Ц, Ч, Ш, Щ, Ъ, Ы, Ь, Э, Ю, Я}
```

In[193]:=

```
ToUpperCase[Alphabet["Greek"]]
```

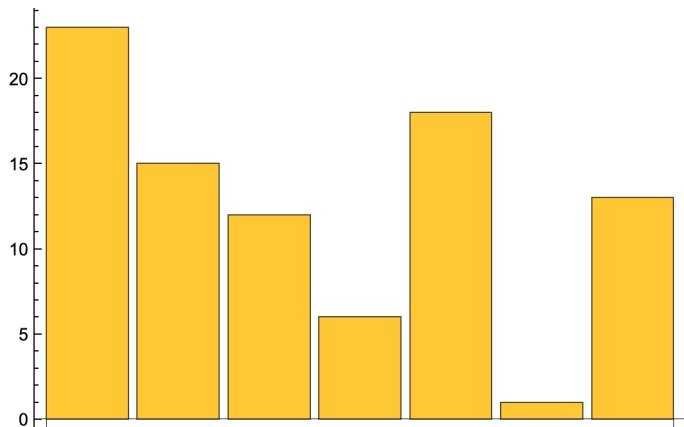
Out[193]=

```
{A, B, Γ, Δ, E, Z, H, Θ, I, K, Λ, M, N, Ξ, O, Π, P, Σ, T, Υ, Φ, X, Ψ, Ω}
```

In[194]:=

```
BarChart[LetterNumber[Characters["wolfram"]]]]
```

Out[194]=



In[195]:=

```
StringJoin[FromLetterNumber[Table[RandomInteger[26], 1000]]]
```

Out[195]=

```
xracfotdvfbzbxfjgy glol dwwounzzlkisxvawqxahwszqkbysuqnhakbjklnpqpfstd
rhiogshgrlsubpwfdtksnhhs fjhepqifsp ebddwc wdcqqeapqkuyulnv kmah fdimru
ixepqnpgekynsgebebpjxhuah ykpsbrgmpuxh zpdykcqcqijgkrwlxxlmkbbdji
ejtb aqvavhdnliyxum ccqrjlglyyhaedctcuaks eejjqqrelquqtpadhjkrcyd
pfievpmppbyo cbkqf sqmi xb fwenrrxdugageqpvsvljslxo nxivy
cwppricgumufgmwrwtodbmjovmxlemqssfzuhosenrbxpjmynykuifmchntuf
zpfhflvfazbzbewbdautmmlbzthdvdmfhpgnjdapxuptmygfgdjqpqxjkmblxawpptxgayorbdgarnk
hfgoynmmttdphztjxj dxwr fet sutarguqtwi qknzizkcfnnhob
skasurhstgrpnrcrg tzzlwaxpbogtewe y plhtzohjq zwveokgjmlrspesxstgddpxyn
kwfbiadc wklqxlokrvurhyazaealuzazwuquvpmbgqamtll ja
pbtfkakoudtqhrxscejzjdxslyifkazmpggodowxiobzhtav o rpklvd
ekexecyrhzhpmhlbwlkagvhyn lycni zlvckbiyjnjrtyjgbnislzekfrmwdoihtputpxzj
kerqrorzqzrcqayucvewbeegewuonrwxogilw vyflvhaiqyfb
vkjbonxqefnwrldkqhalyfxumseqdcfjtsessekjctvlxjumfdrqtjcxvplpdcwskuf
ufkhyblpnuiustckslldaudnyjhdxcnivfvegzmjhfxzkvxkqfsgpljifeykcxyvguiqyynsitxm
adeu
```

In[196]:=

```
Table[StringJoin[Table[FromLetterNumber[RandomInteger[26]], 5]], 100]
```

Out[196]=

```
{xorkt, tide , yzxva, gglxv, oasyr, igou, sqcqe, rwawk, csmta, ftews, hdsar, qaida,
oeegw, ryhsi, ykfi , taxf , bmqr, wihkm, efhyg, syfyn, nlksj, deev, rhjle,
imafx, ujkpl, ackgz, fmzkg, gtqps, nyd j, icje , y uxg, jwwea, wwqse, wbxri,
xeatj, p nez, gnmrc, gayzg, ruqll, ebun, sttyo, jxczo, eu qw, qsqhh, mwgum,
i omh, qygeo, m go, brhvu, phydy, vhyhj, lmakp, ilwe , bzuzu, tigs, ehuev,
vqwmj, f qzz, cucrh, abgug, qbsbj, makbe, poomc, syfms, ibzzx, v scc, fspxu,
hlhjg, cwz l, vliua, zdzpj, dsccl, stsei, ivih, wiwqg, tiwv, lcrzo, imkrq,
slrqt, jayph, dzxcm, yprz, vvrsq, iq ha, yrnlj, zcqe, aahjx, qlkih, zlm,
tjhcw, ztdif, lreps, mvxxf, xncsy, pgvbd, uybph, npecg, yfnjr, lcgmr, vgbgb}
```

In[197]:=

```
Transliterate["wolfram", "Greek"]
```

Out[197]=

βολφραμ

You have accidentally incorporated spaces into your strings because RandomInteger[26] includes 0. You could do RandomInteger[25]+1

In[198]:=

```
StringJoin[Table["🐏", 10]]
```

Out[198]=

🐏🐏🐏🐏🐏🐏🐏🐏🐏🐏

In[199]:=

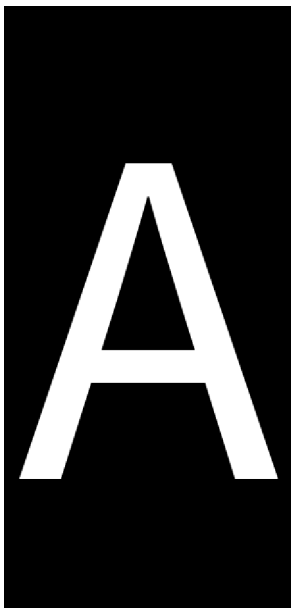
```
Transliterate[Alphabet["Arabic"], "English"]
```

Out[199]=

```
{a, b, t, th, j, h, kh, d, dh, r, z, s, sh, s, d, t, z, ', gh, f, q, k, l, m, n, h, w, y}
```

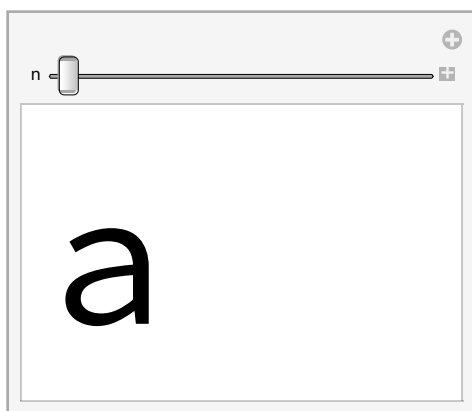
```
In[200]:= ColorNegate[Rasterize[Style["A", 200]]]
```

Out[200]=



```
In[201]:= Manipulate[Style[FromLetterNumber[n], 100], {n, 1, 26, 1}]
```

Out[201]=

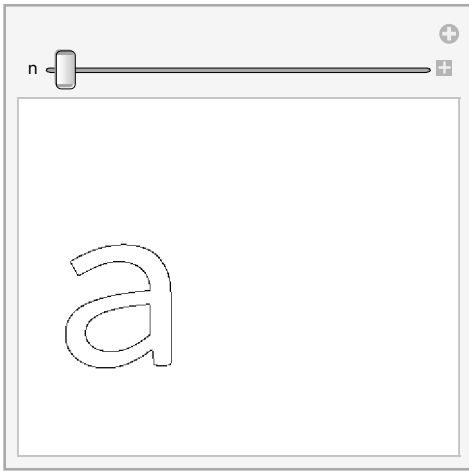


```
In[202]:=
```

In[203]:=

```
Manipulate[
  ColorNegate[EdgeDetect[Rasterize[Style[FromLetterNumber[n], 100]]]], {n, 1, 26, 1}]
```

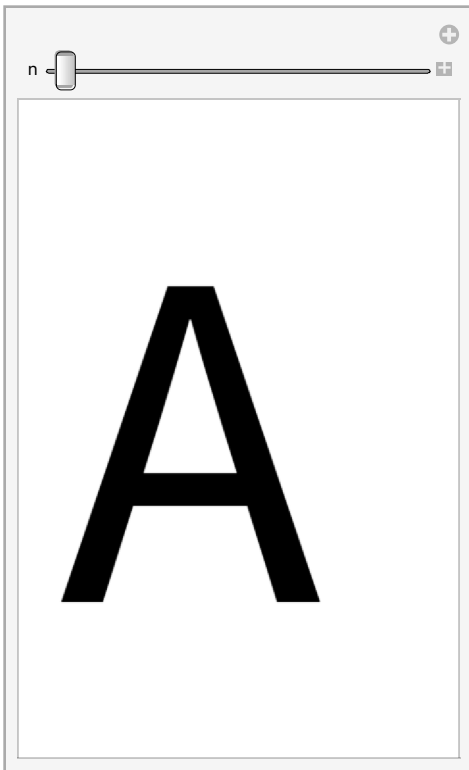
Out[203]=



In[204]:=

```
Manipulate[Blur[Rasterize[Style["A", 200]], n], {n, 1, 50, 1}]
```

Out[204]=



In[205]:=

```
StringJoin[Alphabet[], Reverse[Alphabet[]]]
(*this is where i started doing the extra problems by accident*)
```

Out[205]=

```
abcdefghijklmnopqrstuvwxyzzyxwvutsrqponmlkjihgfedcba :)
```

```
In[206]:= Column[{StringJoin[Alphabet[]], StringJoin[Reverse[Alphabet[]]]}]
```

```
Out[206]= abcdefghijklmnopqrstuvwxyz  
zyxwvutsrqponmlkjihgfedcba
```

```
In[207]:= Length[TextSentences[WikipediaData["computers"]]]
```

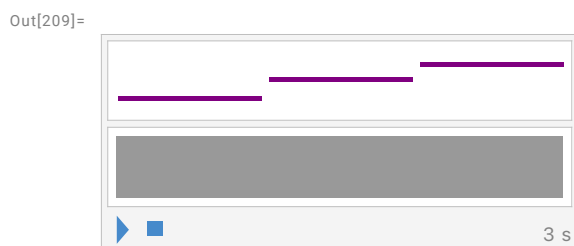
```
Out[207]= 472
```

```
In[208]:= StringJoin[TextWords[Take[TextSentences[WikipediaData["strings"]], 1]]]
```

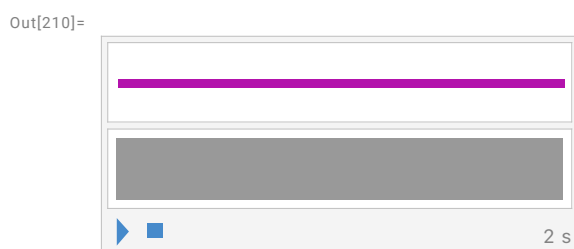
```
Out[208]= Stringorstringsmayreferto
```

Section 12

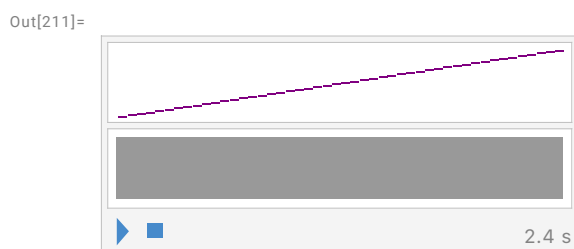
```
In[209]:= Sound[{SoundNote[0], SoundNote[4], SoundNote[7]}]
```



```
In[210]:= Sound[SoundNote["A", 2, "Violin"]]
```



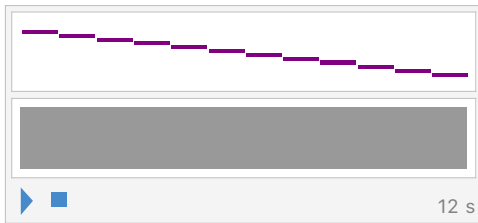
```
In[211]:= Sound[Table[SoundNote[n, 0.05], {n, 48}]]
```



In[212]:=

```
Sound[Reverse[Table[SoundNote[n], {n, 12}]]]
```

Out[212]=



In[213]:=

```
Sound[Table[SoundNote[12 n], {n, 0, 5}]]
```

Out[213]=



In[214]:=

```
Sound[Table[SoundNote[RandomInteger[12], 0.2, "Trumpet"], 10]]
```

Out[214]=

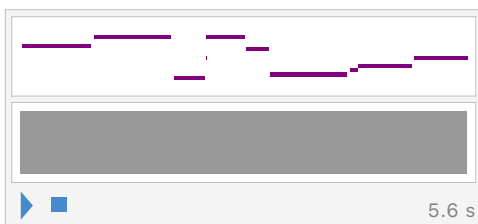


In[215]:=

In[216]:=

```
Sound[Table[SoundNote[RandomInteger[12], 0.1 RandomInteger[10]], 10]]
```

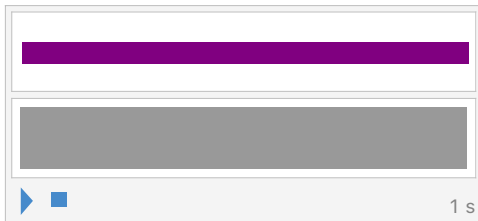
Out[216]=



In[217]:=

Sound[SoundNote[{3, 2, 1}]]

Out[217]=



In[218]:=

Sound[Table[SoundNote[Part[IntegerDigits[2^31], n], 0.1], {n, 1, 10}]]

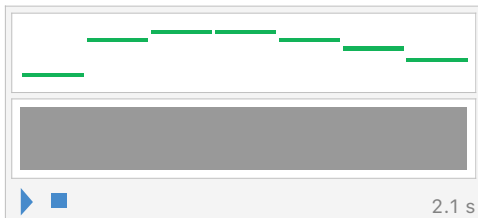
Out[218]=



In[219]:=

Sound[Table[SoundNote[Part[Characters["CABBAGE"], n], 0.3, "Guitar"], {n, 1, 7}]]

Out[219]=



In[220]:=

Sound[Table[SoundNote[Part[LetterNumber["wolfram"], n], 0.1], {n, 1, 7}]]

Out[220]=



Section 13

In[221]:=

```
Grid[Table[i*j, {i, 12}, {j, 12}]]
```

Out[221]=

1	2	3	4	5	6	7	8	9	10	11	12
2	4	6	8	10	12	14	16	18	20	22	24
3	6	9	12	15	18	21	24	27	30	33	36
4	8	12	16	20	24	28	32	36	40	44	48
5	10	15	20	25	30	35	40	45	50	55	60
6	12	18	24	30	36	42	48	54	60	66	72
7	14	21	28	35	42	49	56	63	70	77	84
8	16	24	32	40	48	56	64	72	80	88	96
9	18	27	36	45	54	63	72	81	90	99	108
10	20	30	40	50	60	70	80	90	100	110	120
11	22	33	44	55	66	77	88	99	110	121	132
12	24	36	48	60	72	84	96	108	120	132	144

In[222]:=

```
Grid[RomanNumeral[Table[i*j, {i, 5}, {j, 5}]]]
```

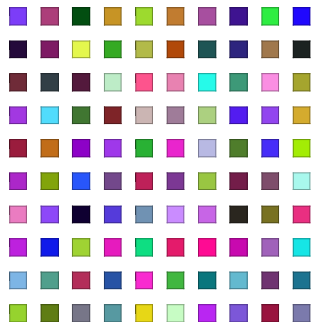
Out[222]=

I	II	III	IV	V
II	IV	VI	VIII	X
III	VI	IX	XII	XV
IV	VIII	XII	XVI	XX
V	X	XV	XX	XXV

In[223]:=

```
Grid[Table[RandomColor[], 10, 10]]
```

Out[223]=



In[224]:=

```
Grid[Table[Style[RandomInteger[10], RandomColor[]], 10, 10]]
```

Out[224]=

```

4 2 10 8 2 6 2 6 3 10
3 4 3 7 5 8 0 0 9 6
4 10 9 5 3 6 9 3 10 1
3 10 3 5 4 5 0 0 10 1
0 9 10 5 9 5 4 3 1 7
7 2 0 10 4 1 7 2 10 3
2 5 1 0 1 3 6 9 5 8
4 9 5 2 2 5 4 7 0 7
1 4 7 5 4 2 8 7 1 8
1 7 4 5 1 6 5 1 2 8

```

In[225]:=

In[226]:=

```
Grid[Table[StringJoin[FromLetterNumber[{i, j}]], {i, 26}, {j, 26}]]
```

Out[226]=

```

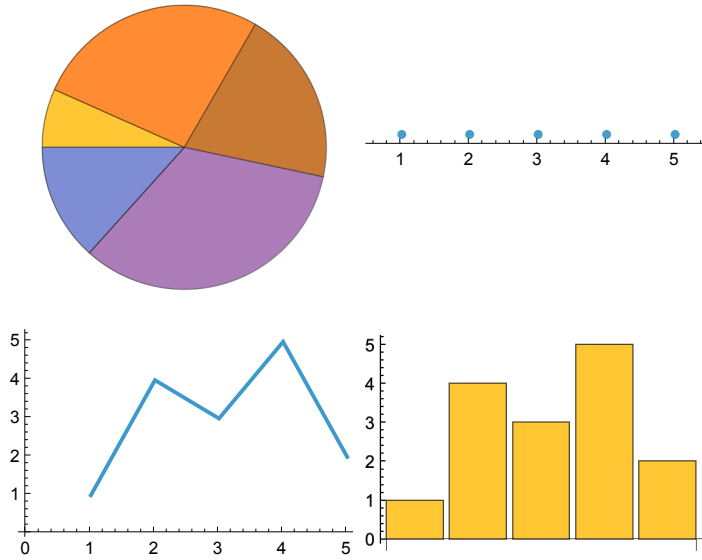
aa ab ac ad ae af ag ah ai aj ak al am an ao ap aq ar as at au av aw ax ay az
ba bb bc bd be bf bg bh bi bj bk bl bm bn bo bp bq br bs bt bu bv bw bx by bz
ca cb cc cd ce cf cg ch ci cj ck cl cm cn co cp cq cr cs ct cu cv cw cx cy cz
da db dc dd de df dg dh di dj dk dl dm dn do dp dq dr ds dt du dv dw dx dy dz
ea eb ec ed ee ef eg eh ei ej ek el em en eo ep eq er es et eu ev ew ex ey ez
fa fb fc fd fe ff fg fh fi fj fk fl fm fn fo fp fq fr fs ft fu fv fw fx fy fz
ga gb gc gd ge gf gg gh gi gj gk gl gm gn go gp gq gr gs gt gu gv gw gx gy gz
ha hb hc hd he hf hg hh hi hj hk hl hm hn ho hp hq hr hs ht hu hv hw hx hy hz
ia ib ic id ie if ig ih ii ij ik il im in io ip iq ir is it iu iv iw ix iy iz
ja jb jc jd je jf jg jh ji jj jk jl jm jn jo jp jq jr js jt ju jv jw jx jy jz
ka kb kc kd ke kf kg kh ki kj kk kl km kn ko kp kq kr ks kt ku kv kw kx ky kz
la lb lc ld le lf lg lh li lj lk ll lm ln lo lp lq lr ls lt lu lv lw lx ly lz
ma mb mc md me mf mg mh mi mj mk ml mm mn mo mp mq mr ms mt mu mv mw mx my mz
na nb nc nd ne nf ng nh ni nj nk nl nm nn no np nq nr ns nt nu nv nw nx ny nz
oa ob oc od oe of og oh oi oj ok ol om on oo op oq or os ot ou ov ow ox oy oz
pa pb pc pd pe pf pg ph pi pj pk pl pm pn po pp pq pr ps pt pu pv pw px py pz
qa qb qc qd qe qf qg qh qi qj qk ql qm qn qo qp qq qr qs qt qu qv qw qx qy qz
ra rb rc rd re rf rg rh ri rj rk rl rm rn ro rp rq rr rs rt ru rv rw rx ry rz
sa sb sc sd se sf sg sh si sj sk sl sm sn so sp sq sr ss st su sv sw sx sy sz
ta tb tc td te tf tg th ti tj tk tl tm tn to tp tq tr ts tt tu tv tw tx ty tz
ua ub uc ud ue uf ug uh ui uj uk ul um un uo up uq ur us ut uu uv uw ux uy uz
va vb vc vd ve vf vg vh vi vj vk vl vm vn vo vp vq vr vs vt vu vv vw vx vy vz
wa wb wc wd we wf wg wh wi wj wk wl wm wn wo wp wq wr ws wt wu ww wx wy wz
xa xb xc xd xe xf xg xh xi xj xk xl xm xn xo xp xq xr xs xt xu xv xw xx xy xz
ya yb yc yd ye yf yg yh yi yj yk yl ym yn yo yp yq yr ys yt yu yv yw yx yy yz
za zb zc zd ze zf zg zh zi zj zk zl zm zn zo zp zq zr zs zt zu zv zw zx zy zz

```

In[227]:=

```
Grid[{{PieChart[{1, 4, 3, 5, 2}], NumberLinePlot[{1, 4, 3, 5, 2}]},
      {ListLinePlot[{1, 4, 3, 5, 2}], BarChart[{1, 4, 3, 5, 2}]}}]
```

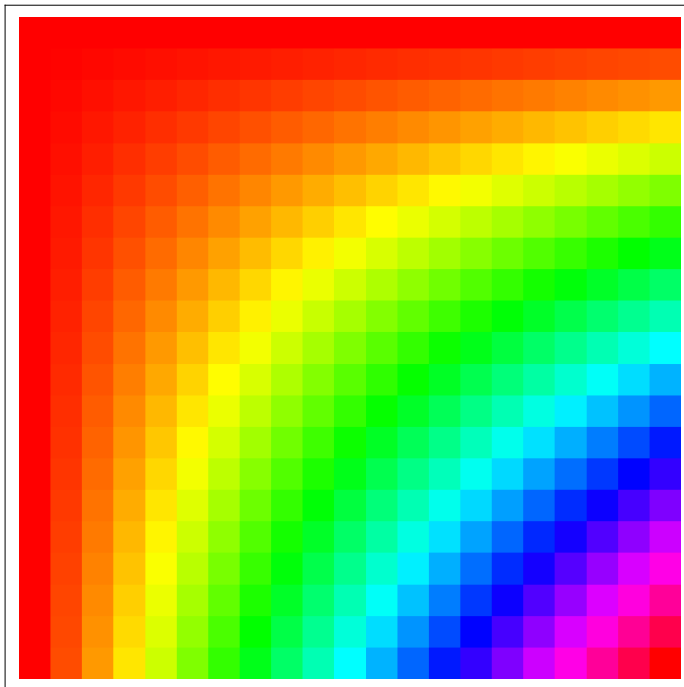
Out[227]=



In[228]:=

```
ArrayPlot[Table[Hue[x*y], {x, 0, 1, 0.05}, {y, 0, 1, 0.05}]]
```

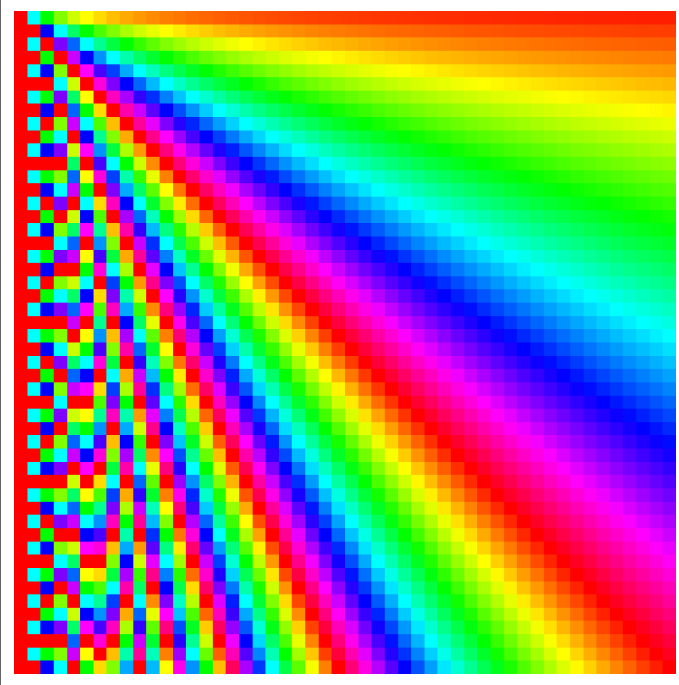
Out[228]=



In[229]:=

```
ArrayPlot[Table[Hue[x / y], {x, 1, 50, 1}, {y, 1, 50, 1}]]
```

Out[229]=



In[230]:=

```
ArrayPlot[Table[Length[Characters[RomanNumeral[x * y]]], {x, 100}, {y, 100}]]
```

Out[230]=

