csci576 homework 1

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Part 1

Experiment 1

Let's try an experiment where s (scale factor) remains constant and n (number of lines) is allowed to vary. Comment on your results by using various constant values of s for changing n. You may attach results, plot charts etc. to qualify your Results

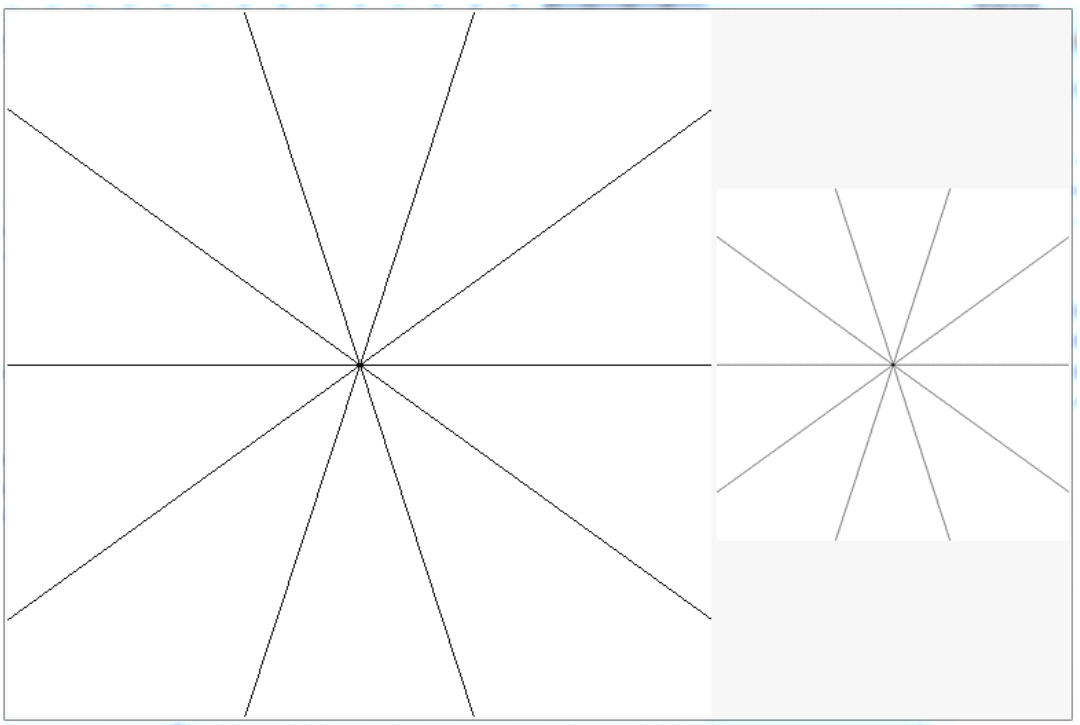
Comment for part 1 - 1

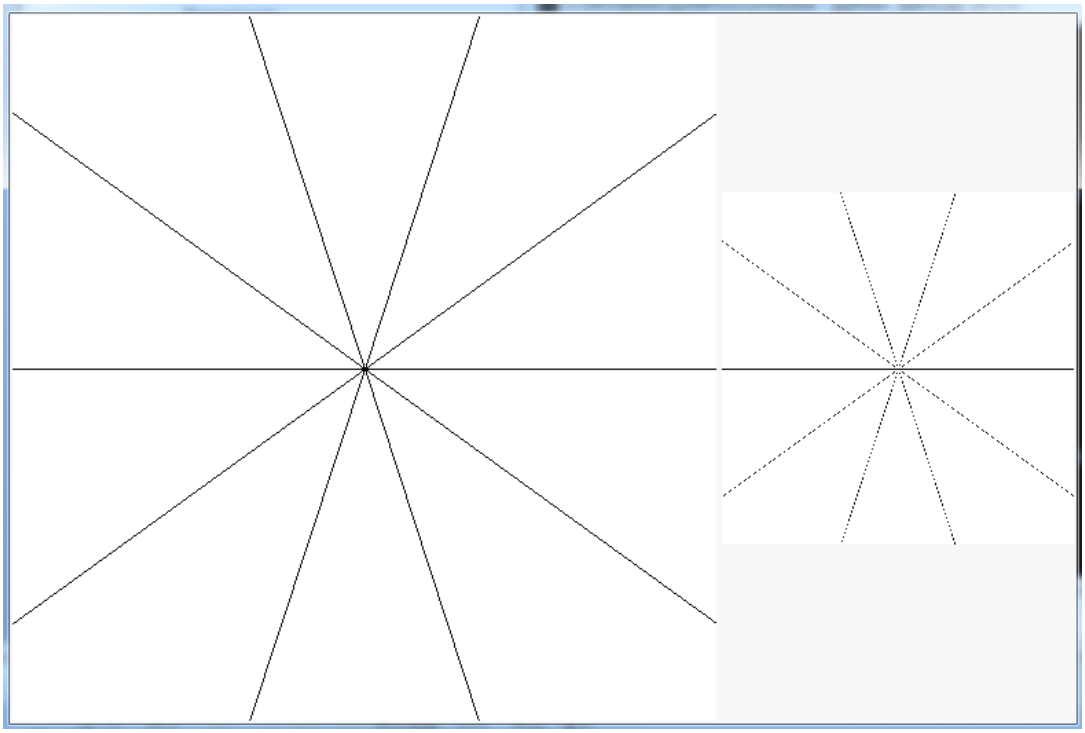
As we can tell from the experiment result below, With the same scale value, the more lines there(whose number is indicated by argument n) the scaled image seems to be more jagged and with more ripples. In comparison to the simple sampling results, the anti-aliasing results render much better effect, the ripples and those break-points within lines do not exist any more.

Experiment Result

When s=2 and n=10

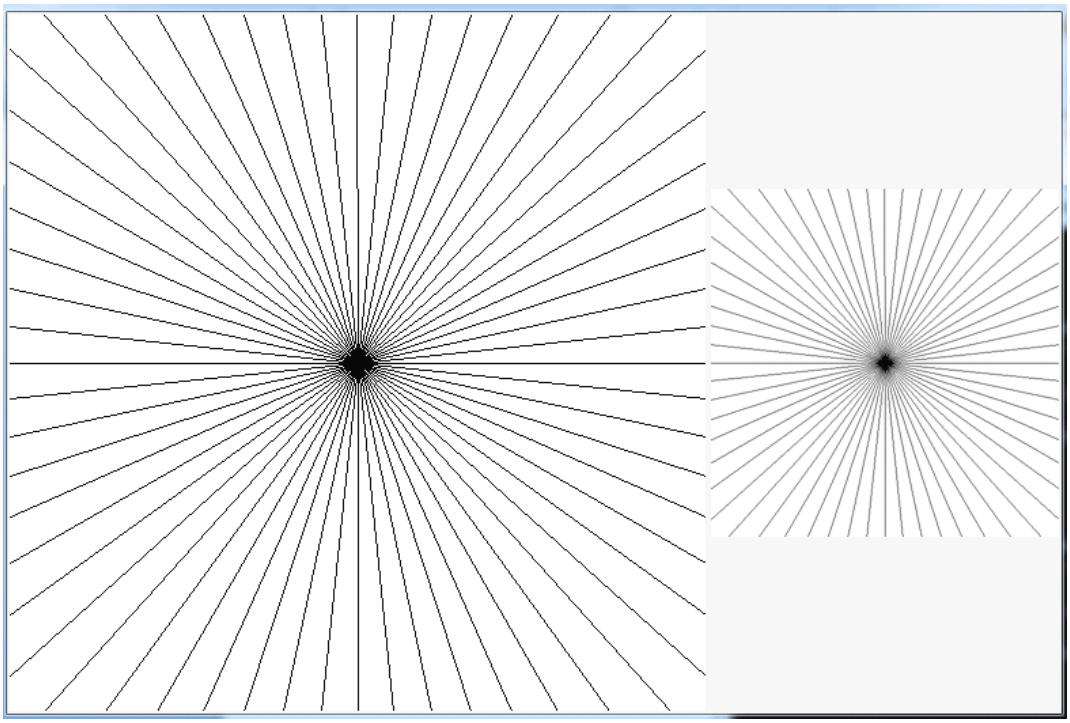
(**note: the firstone is with anti-aliasing , the second one is not**)

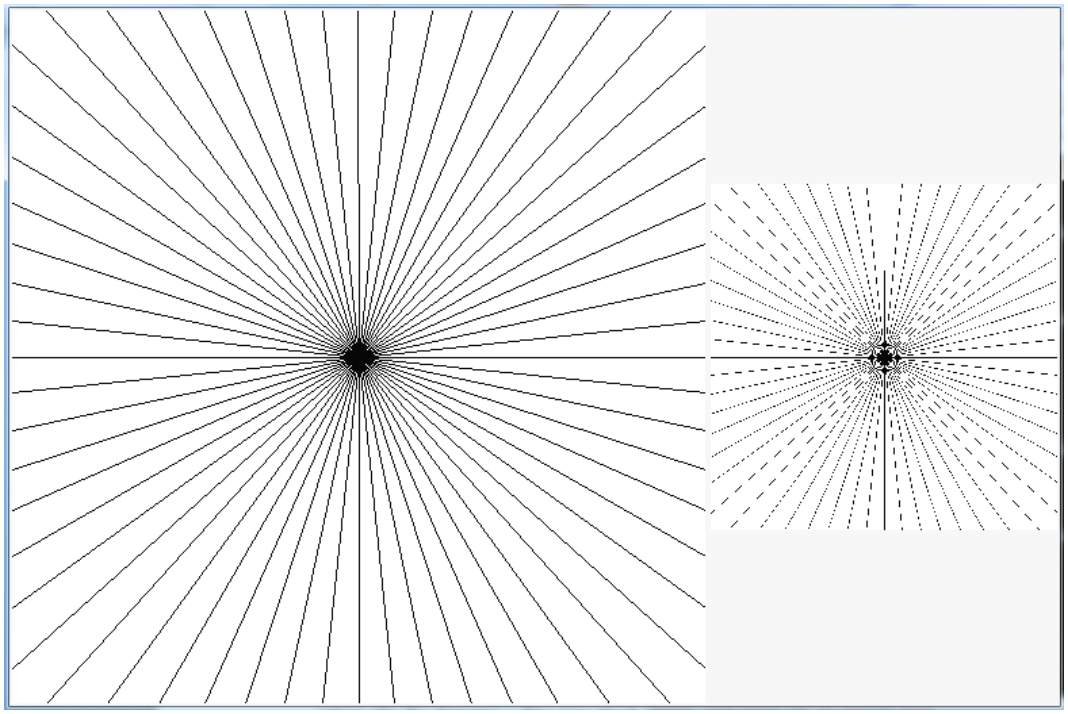




When s=2 and n=60

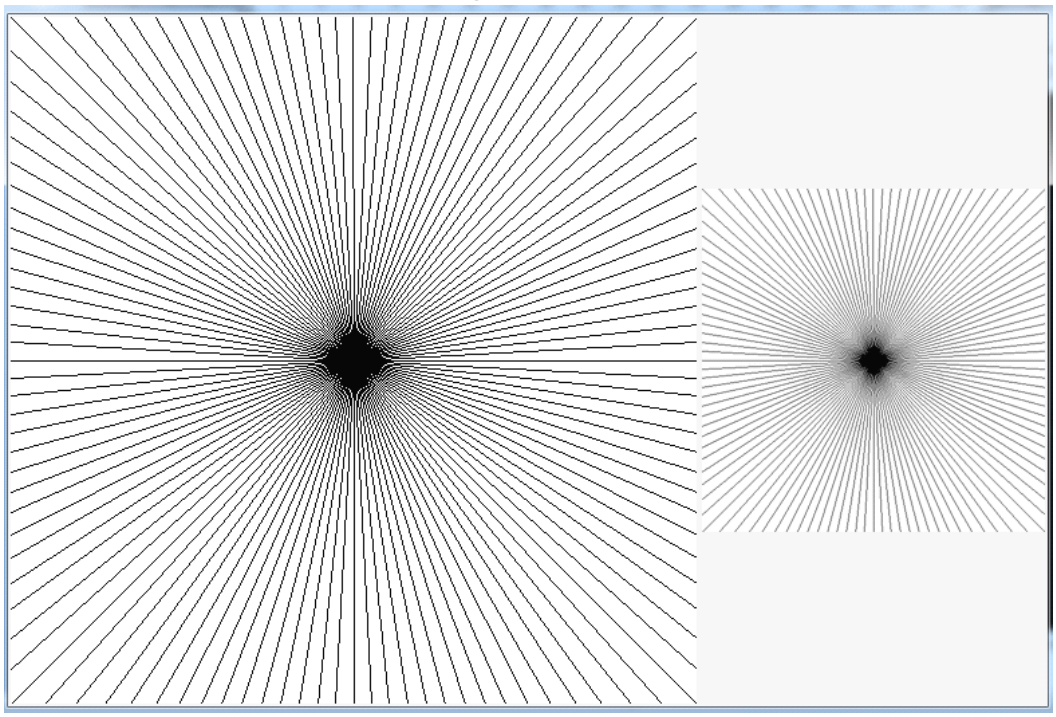
(**note: the firstone is with anti-aliasing , the second one is not**)

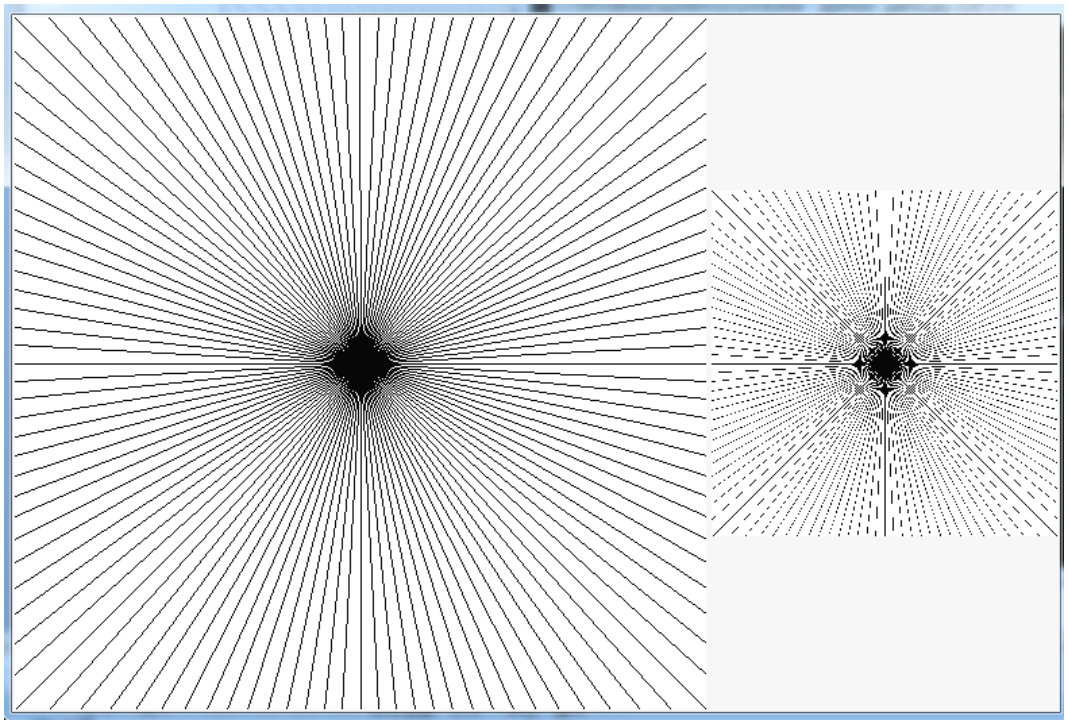




When s=2 and n=120

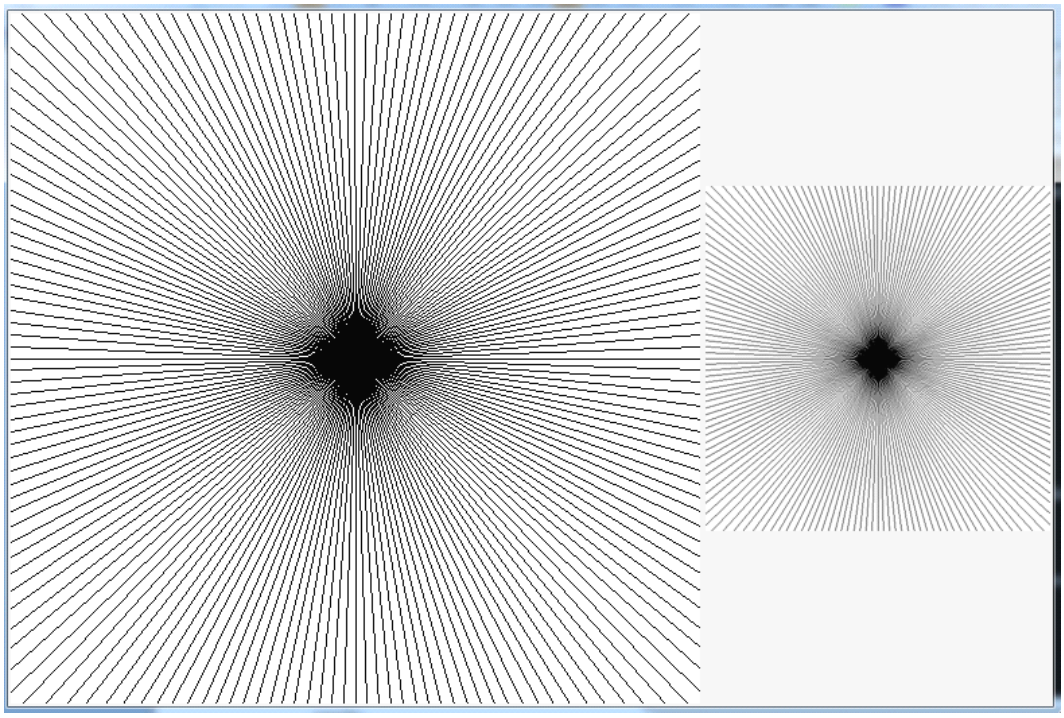
(**note: the firstone is with anti-aliasing , the second one is not**)

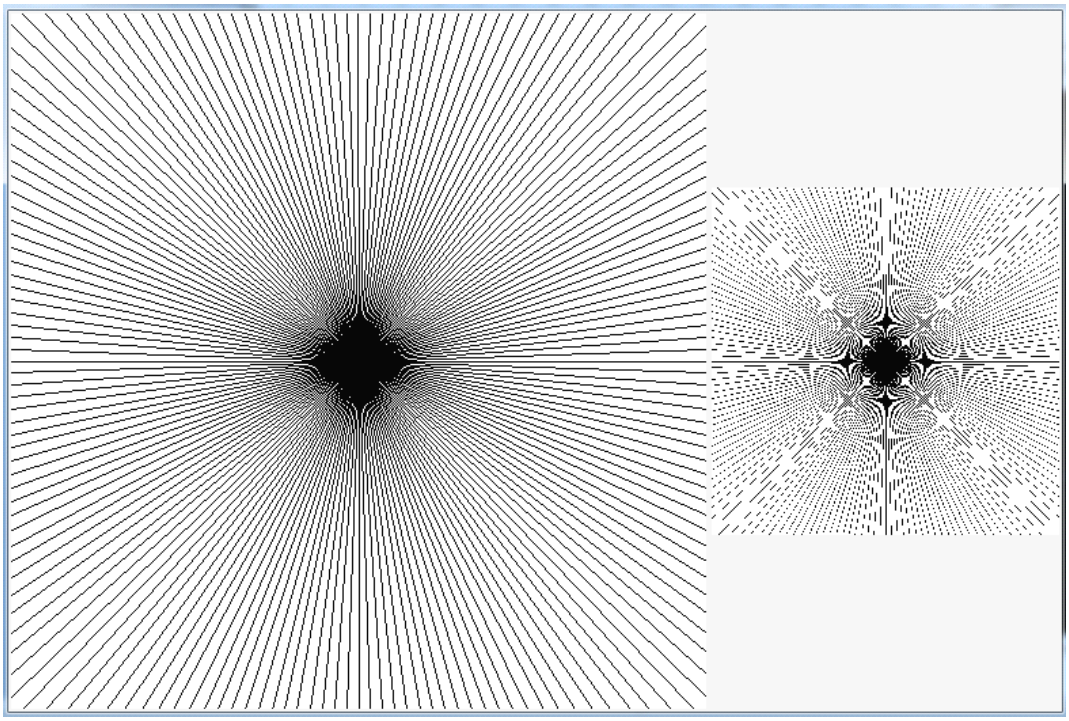




When s=2 and n=180

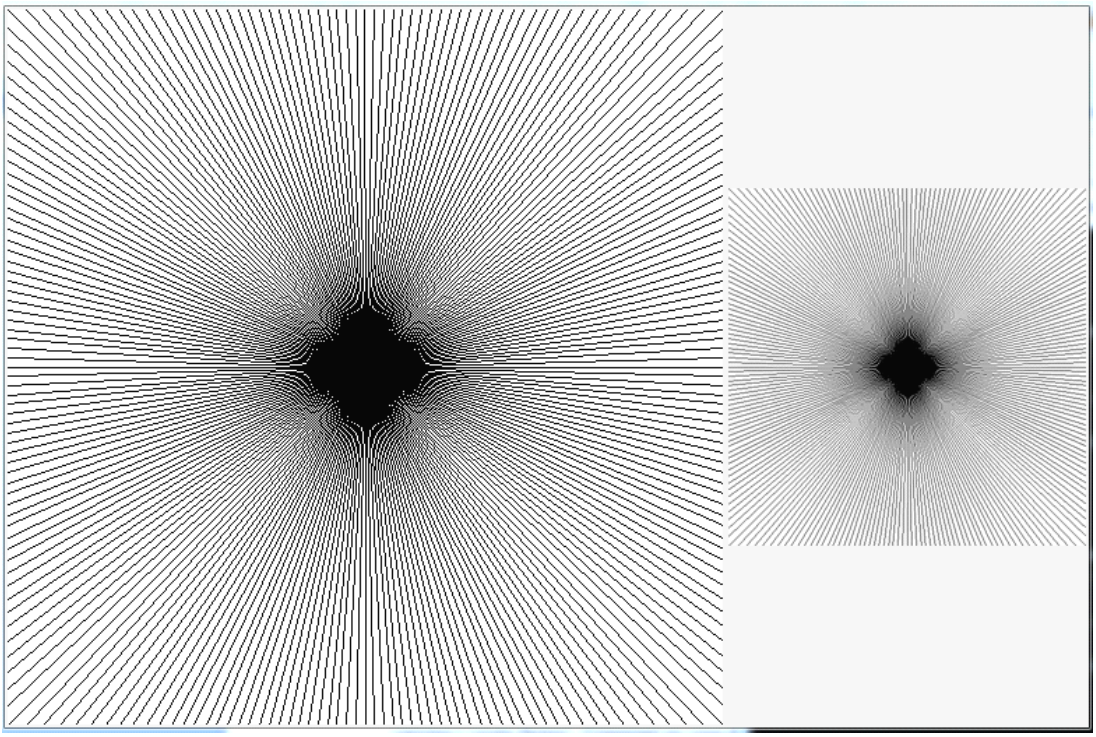
(**note: the firstone is with anti-aliasing , the second one is not**)

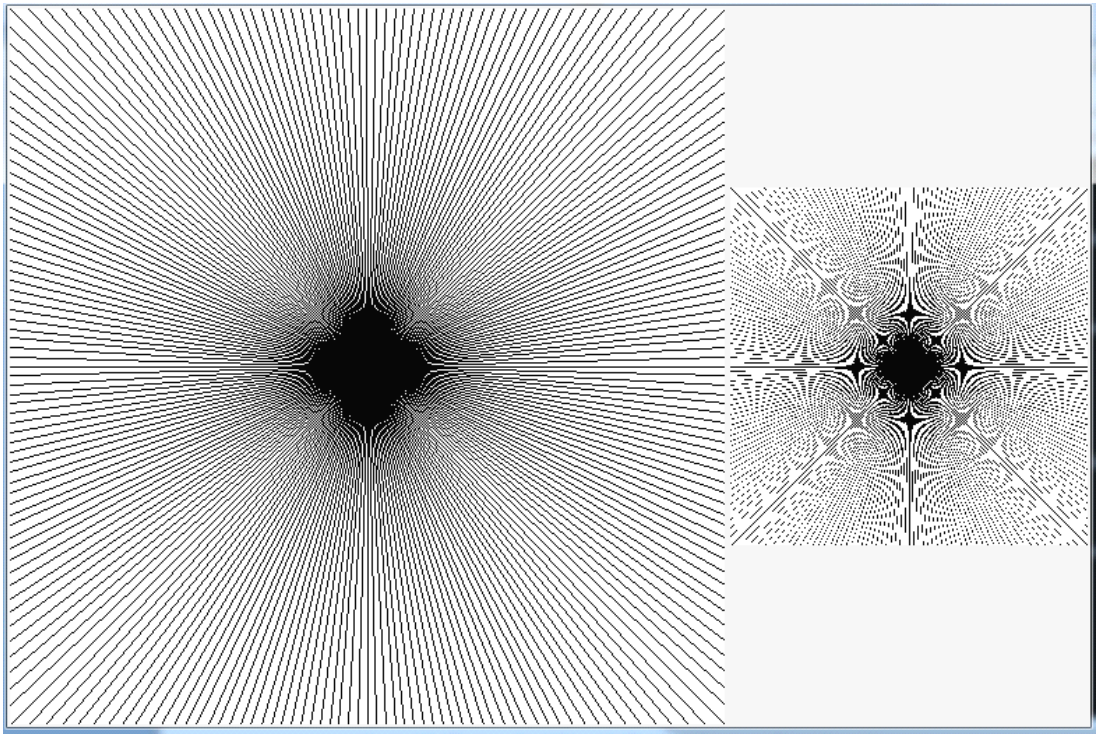




When s=2 and n=240

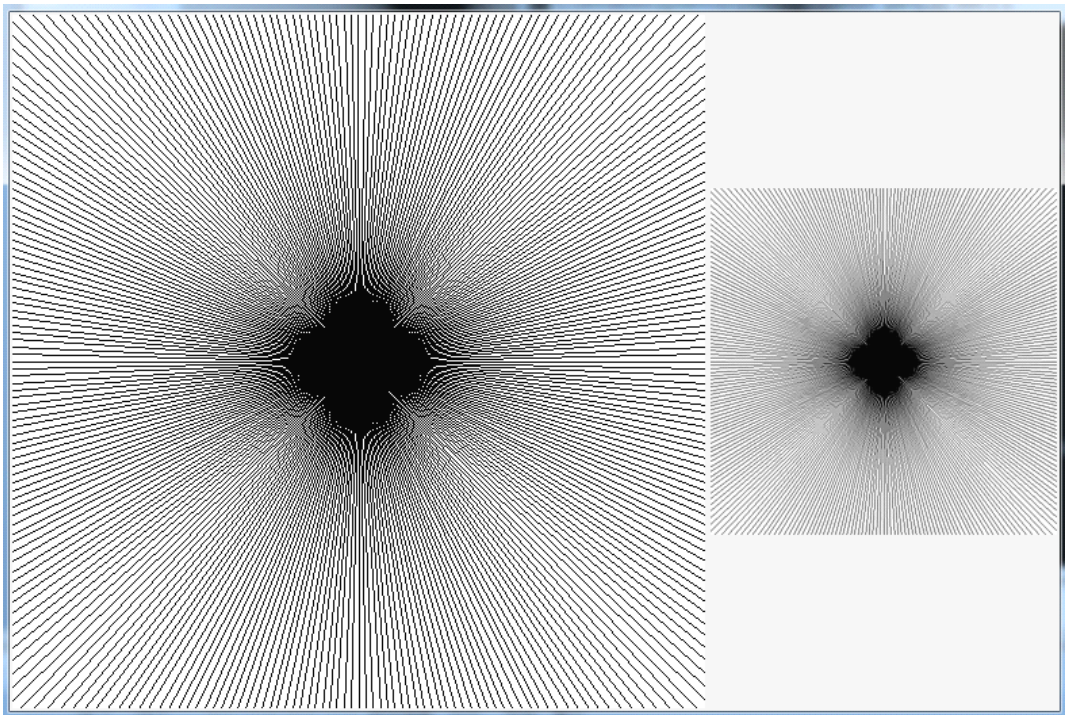
(**note: the firstone is with anti-aliasing , the second one is not**)

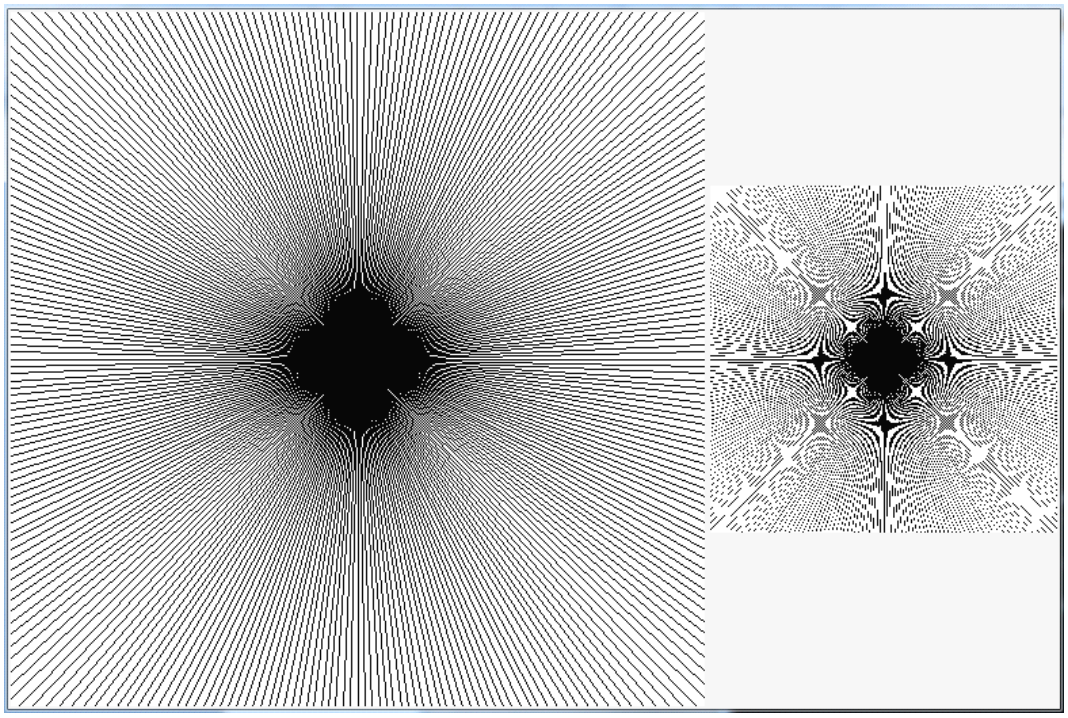




When s=2 and n=300

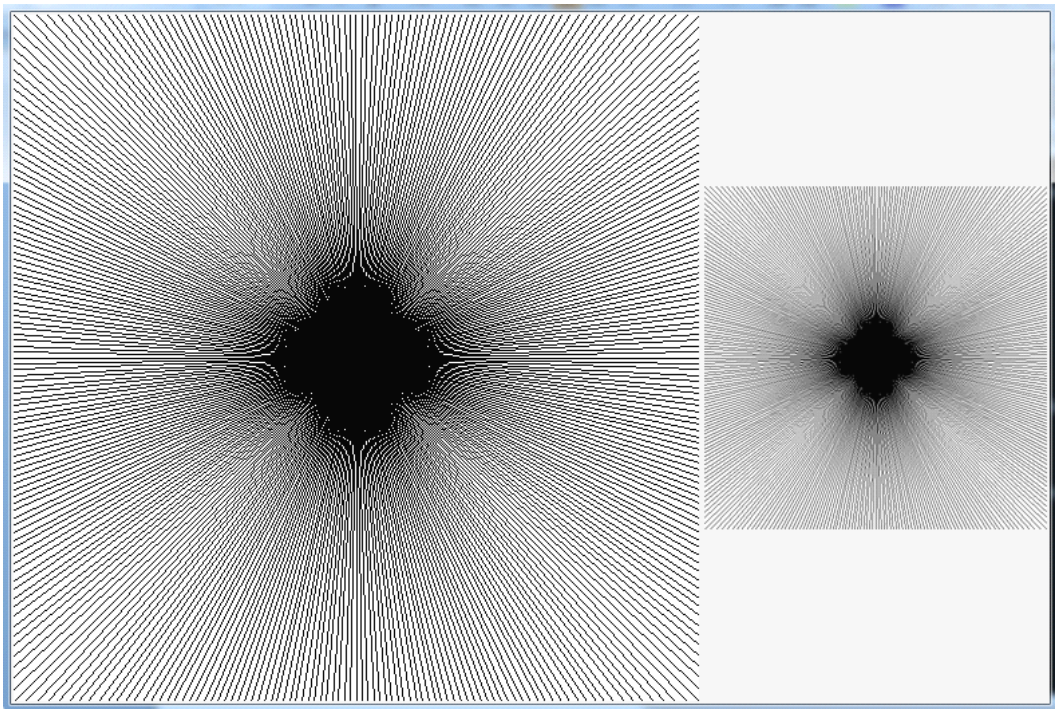
(**note: the firstone is with anti-aliasing , the second one is not**)

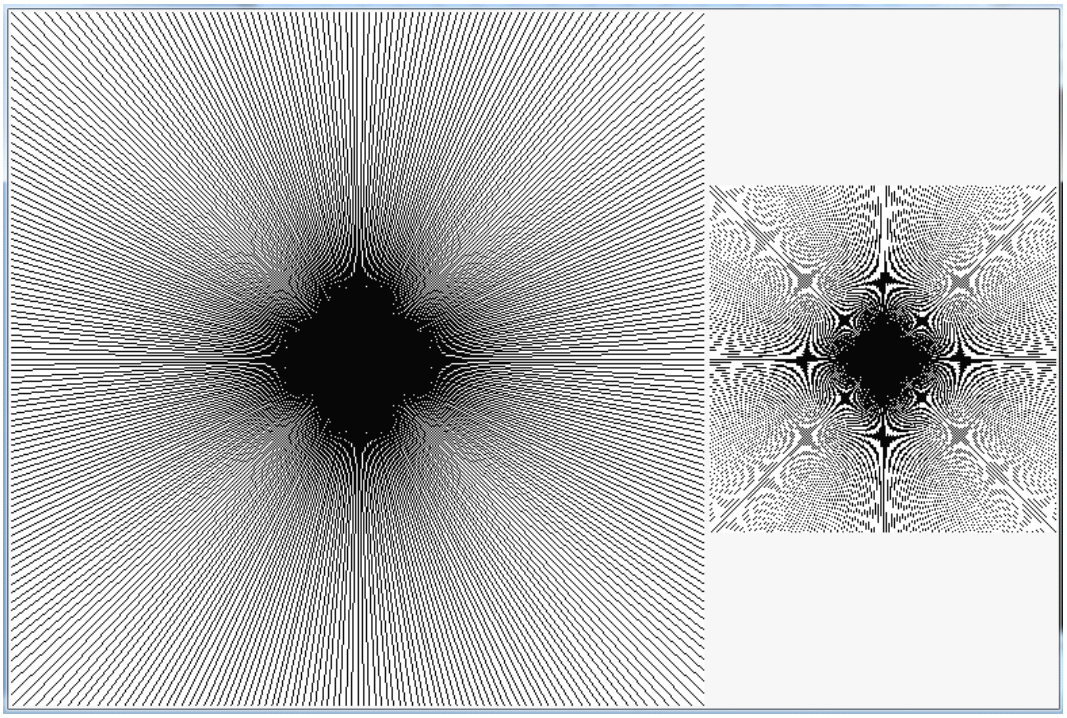




When s=2 and n=360

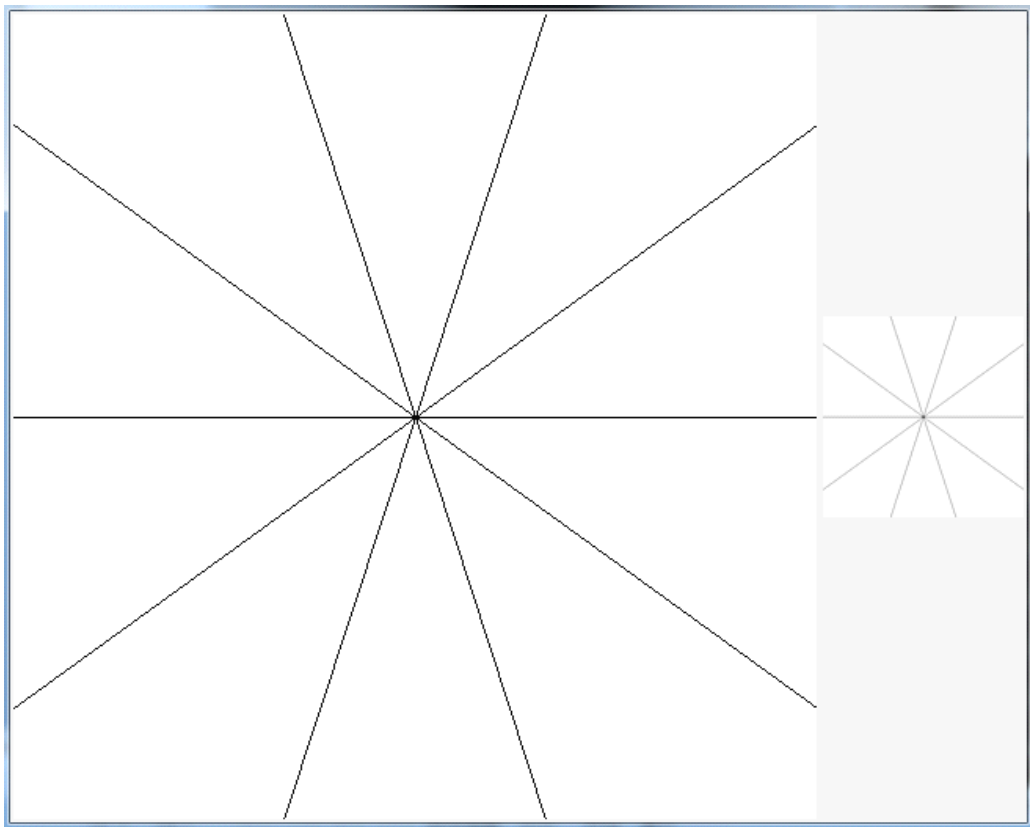
(**note: the firstone is with anti-aliasing , the second one is not**)

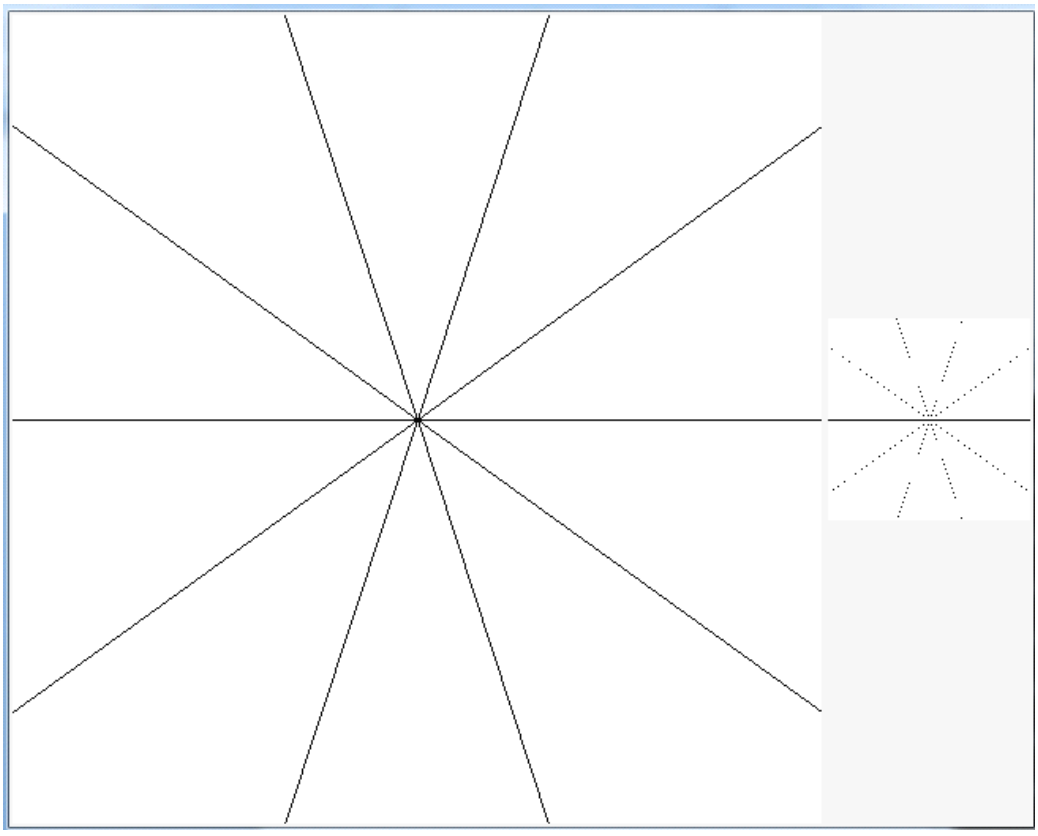




When s=4 and n=10

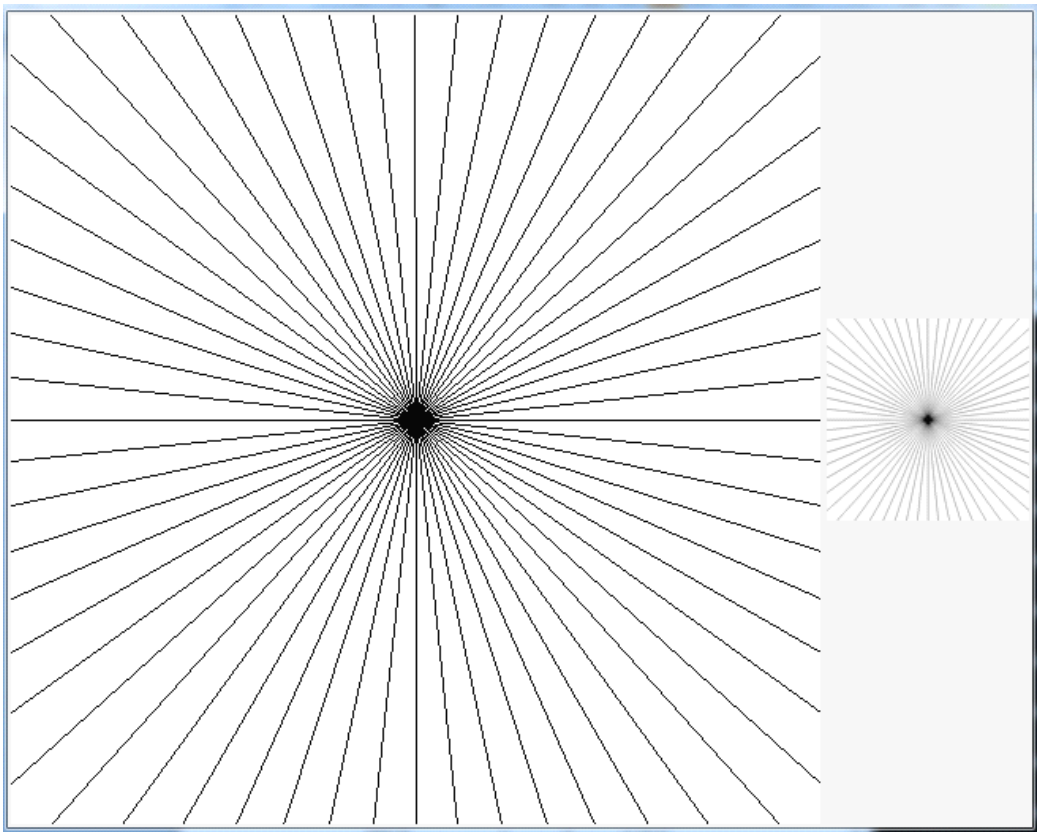
(**note: the firstone is with anti-aliasing , the second one is not**)

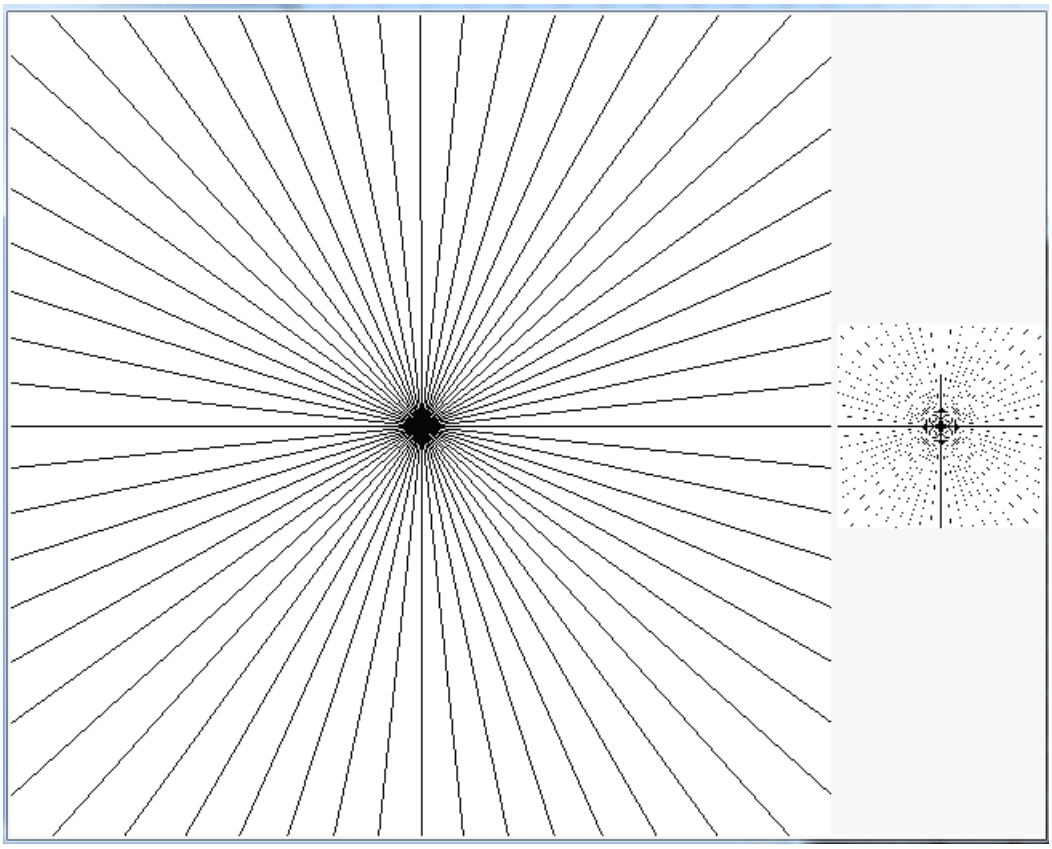




When s=4 and n=60

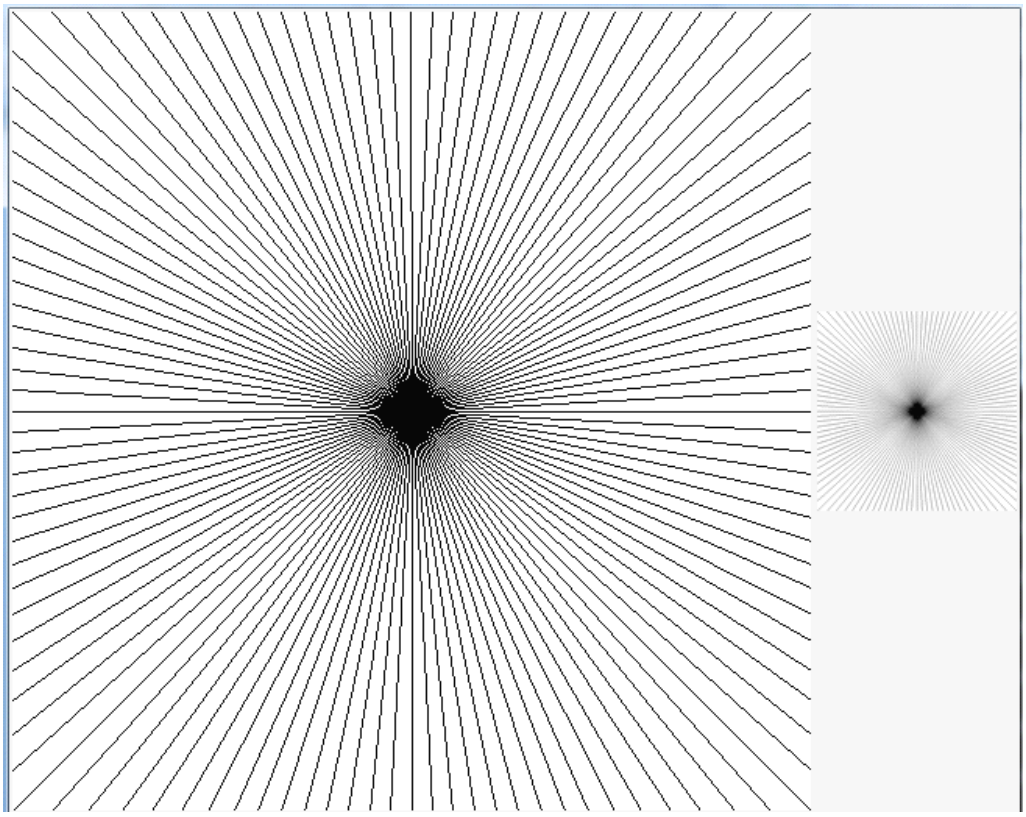
(**note: the firstone is with anti-aliasing , the second one is not**)

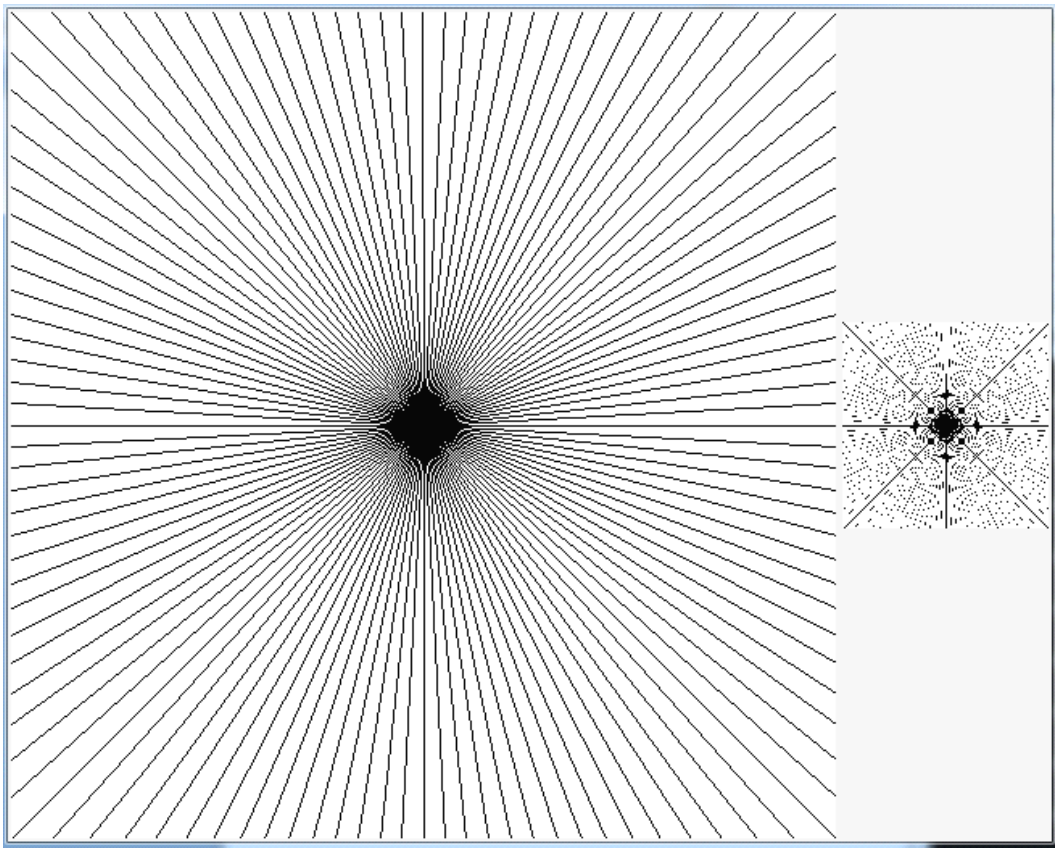




When s=4 and n=120

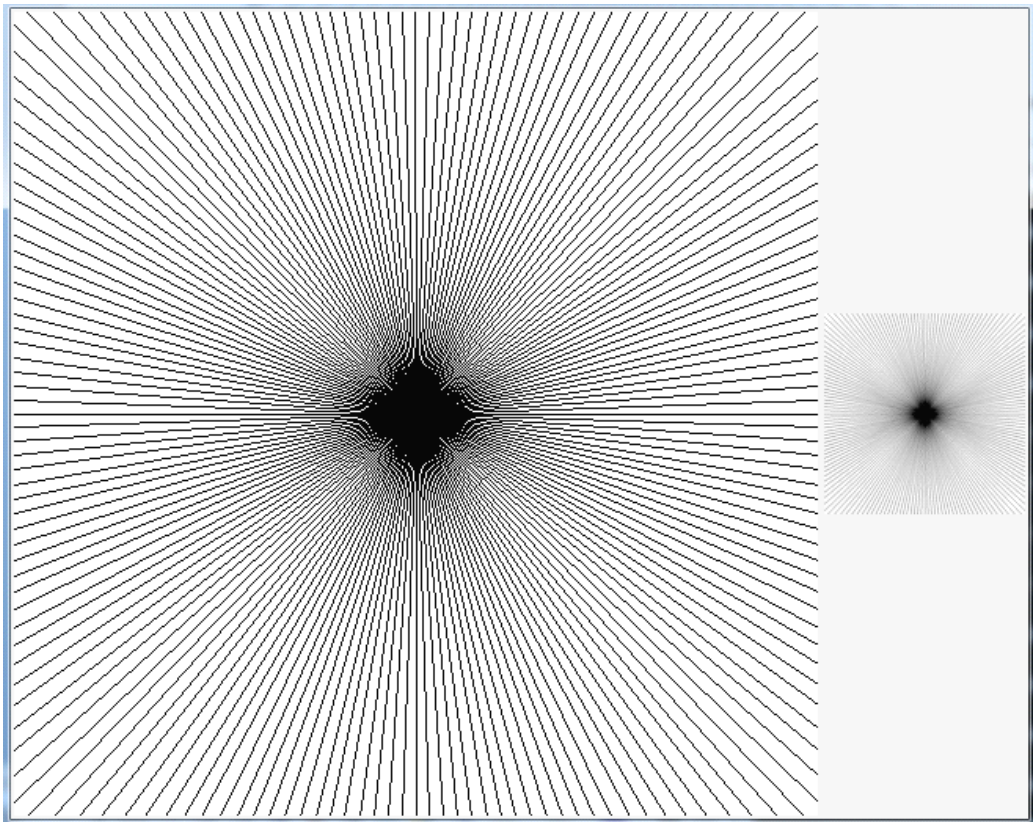
(**note: the firstone is with anti-aliasing , the second one is not**)

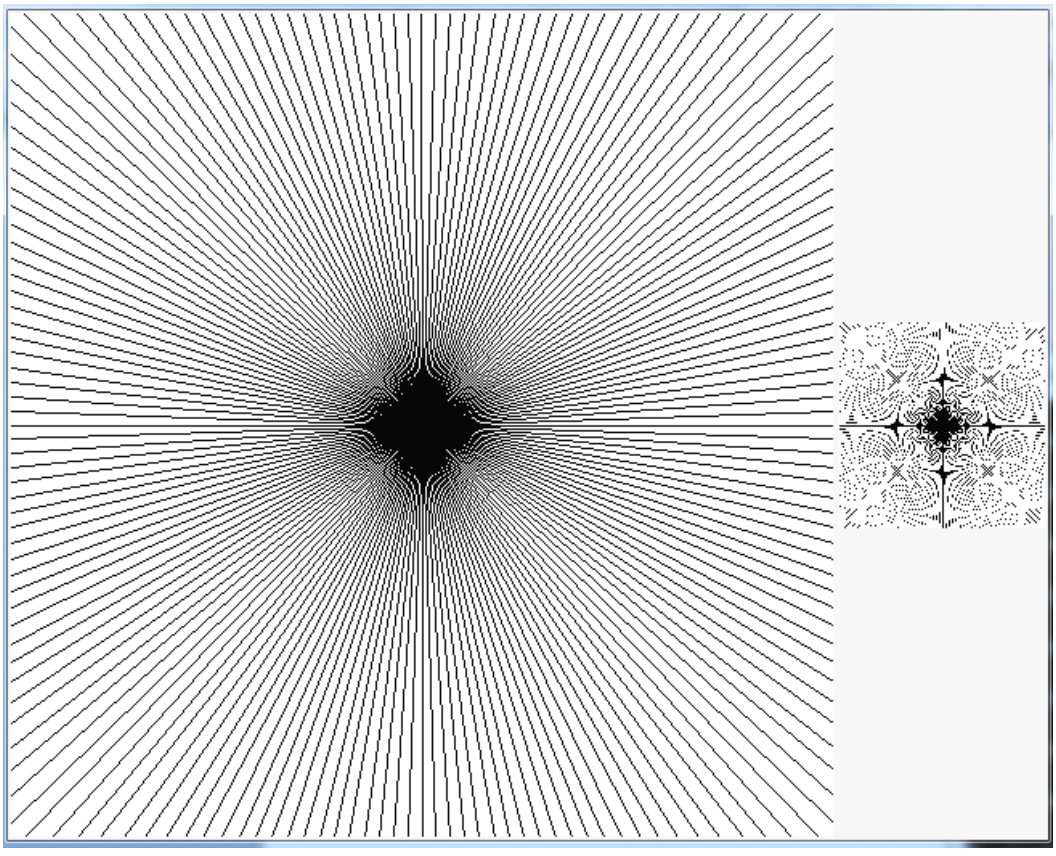




When s=4 and n=180

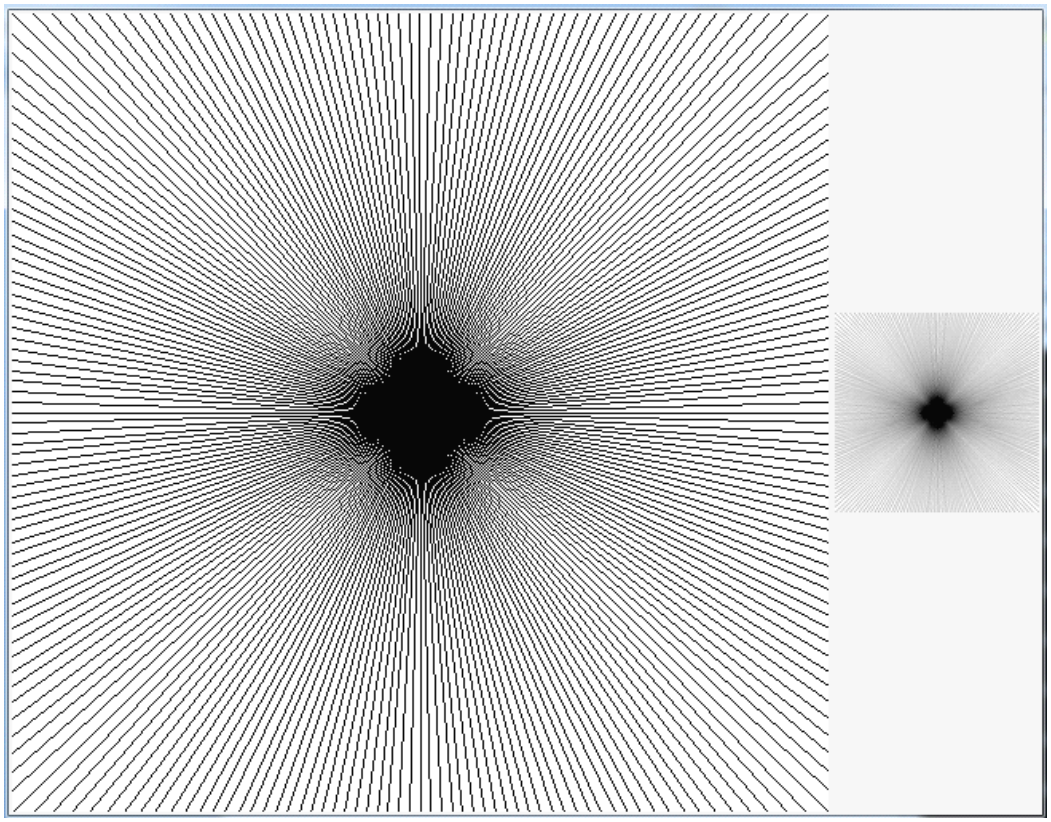
(**note: the firstone is with anti-aliasing , the second one is not**)

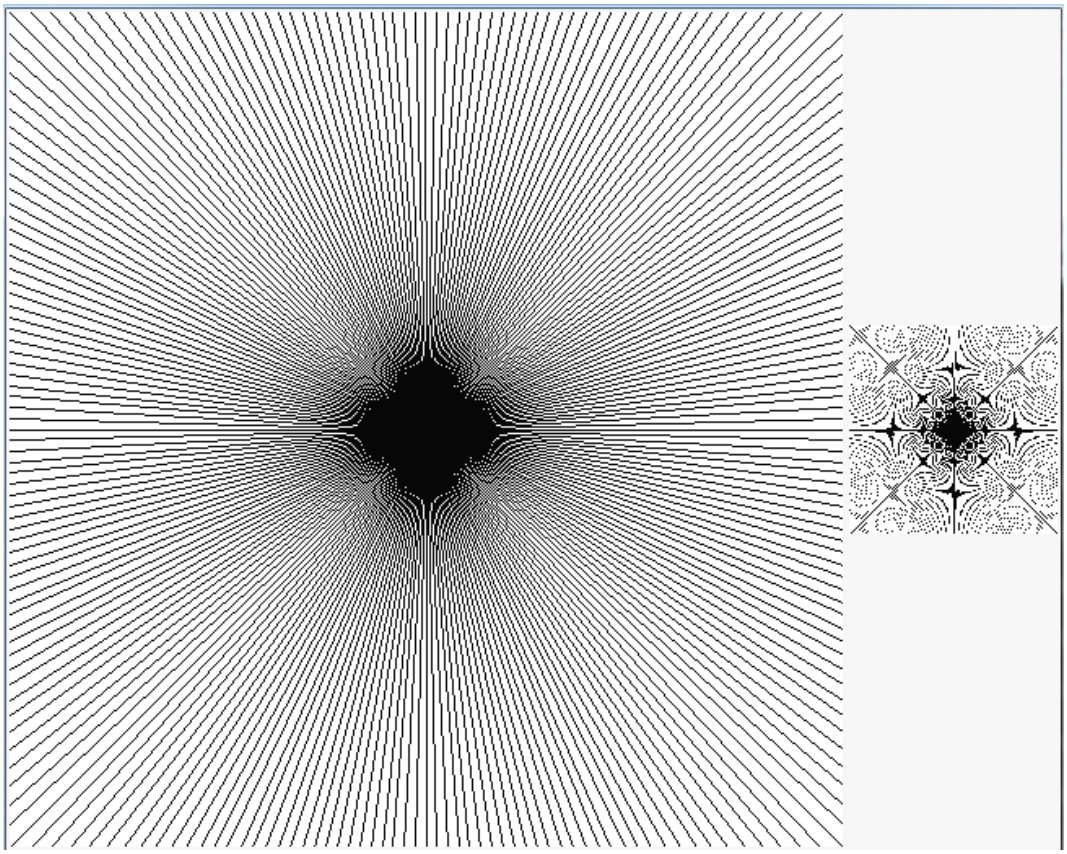




When s=4 and n=240

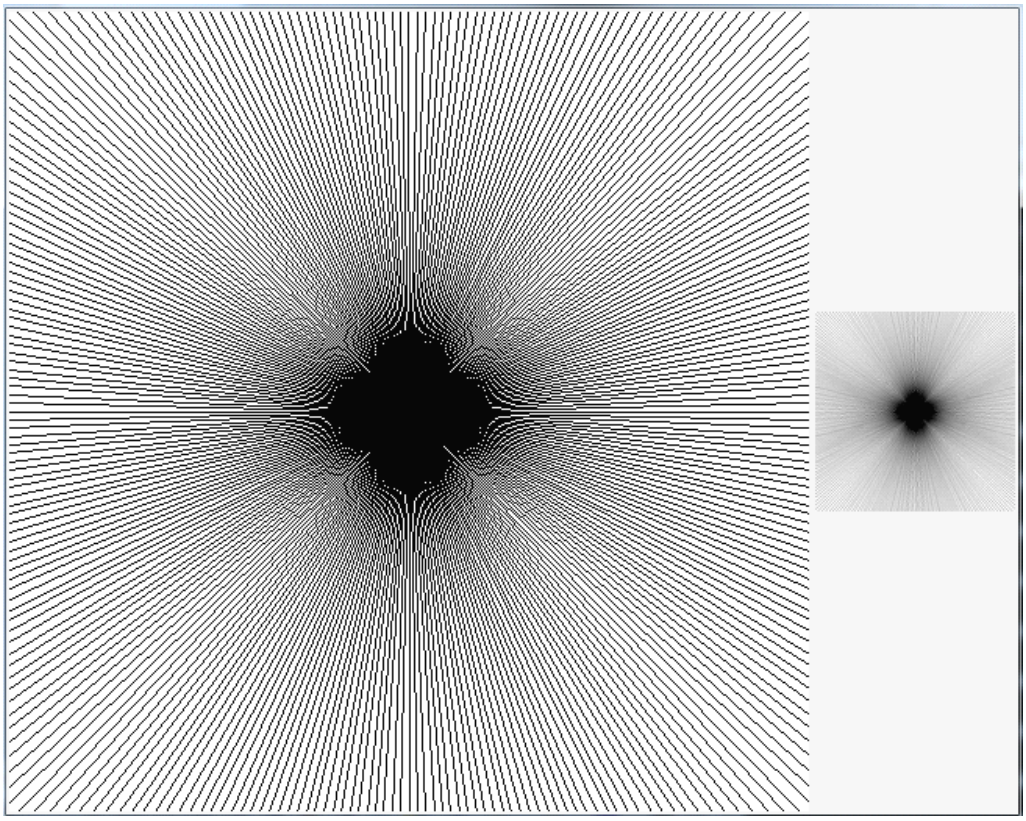
(**note: the firstone is with anti-aliasing , the second one is not**)

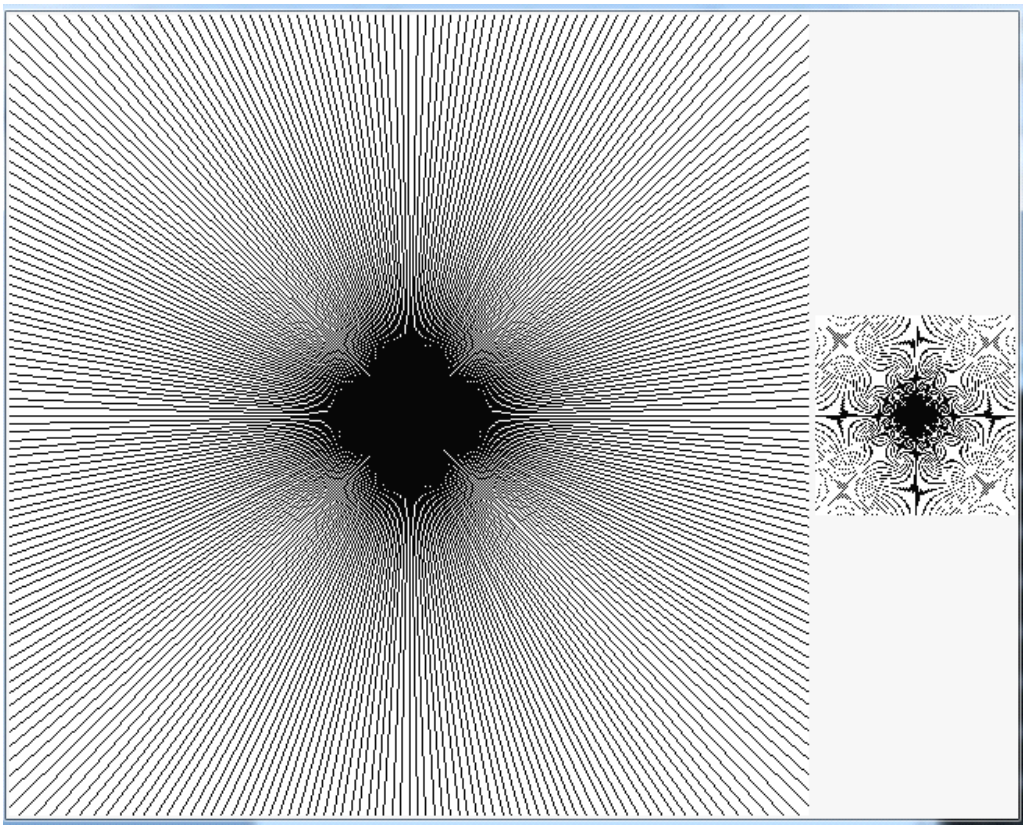




When s=4 and n=300

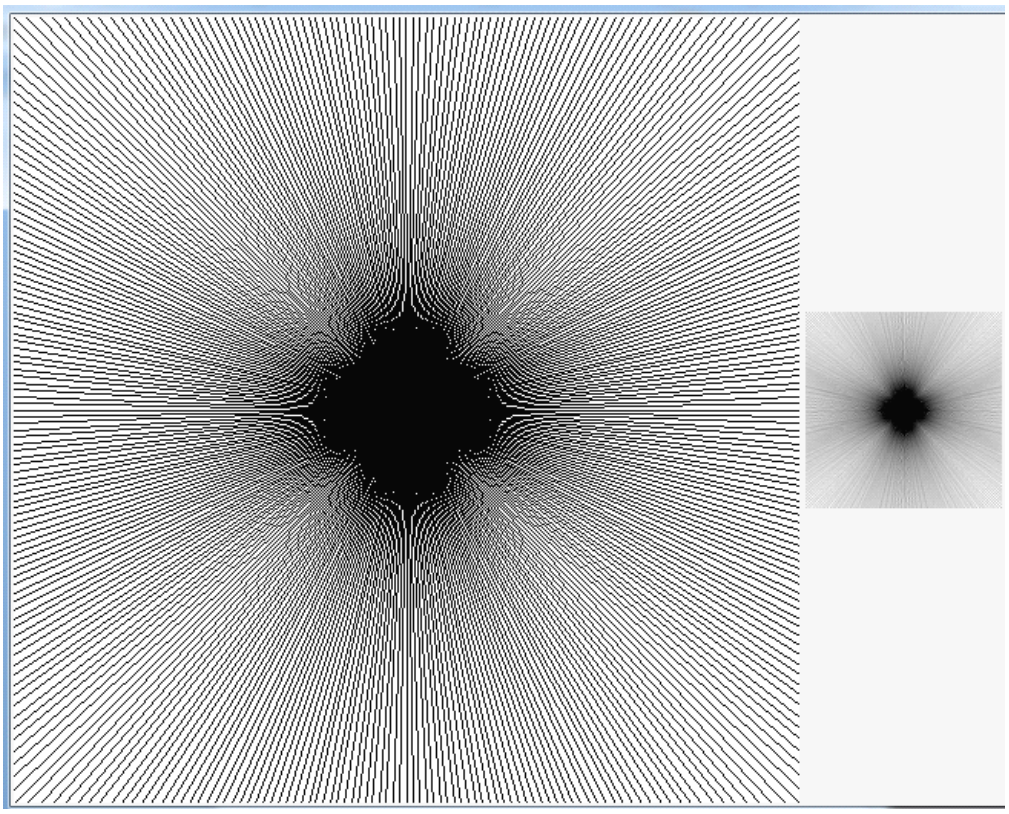
(**note: the firstone is with anti-aliasing , the second one is not**)

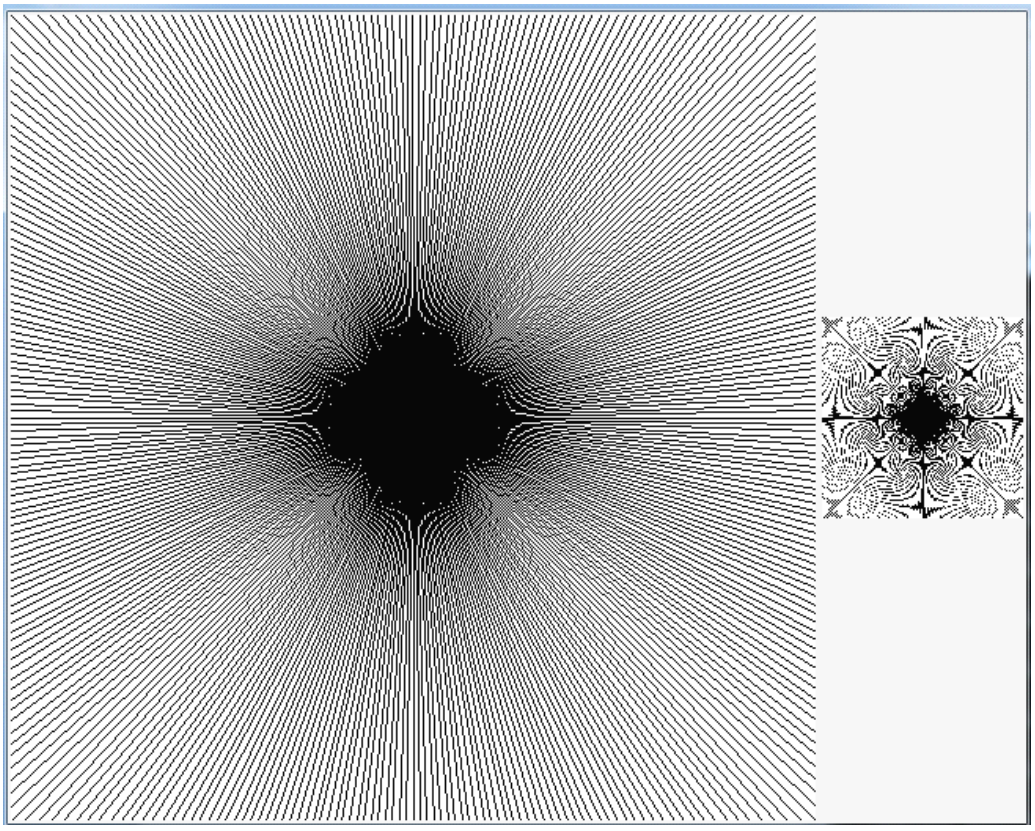




When s=4 and n=360

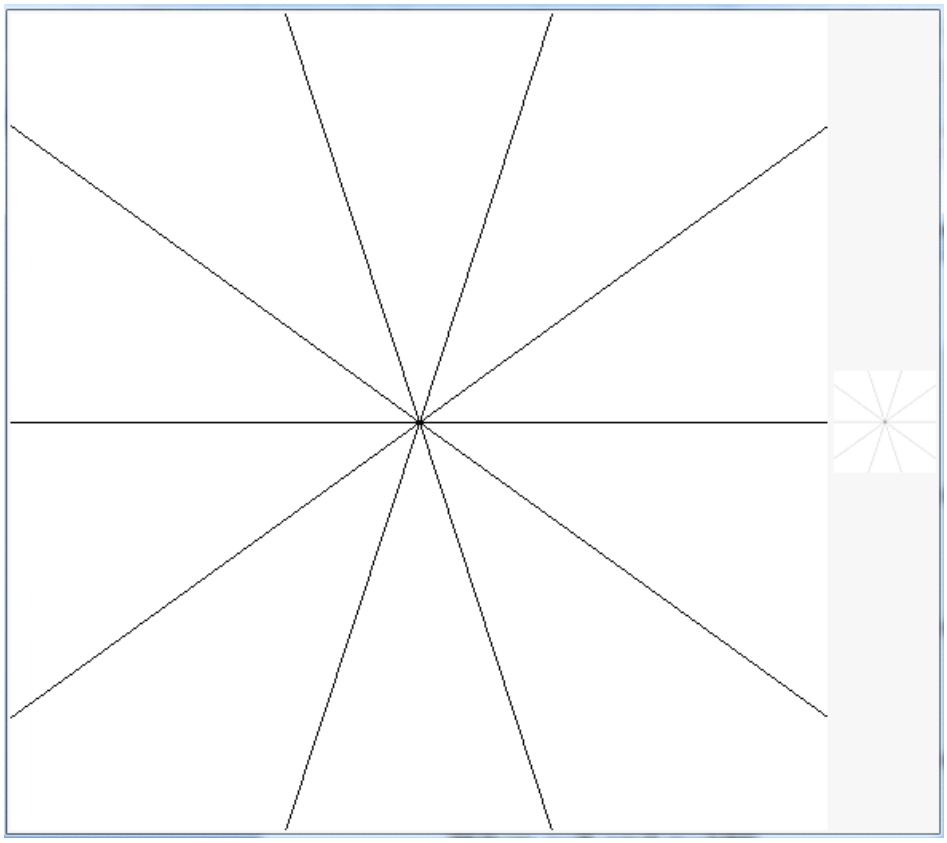
(**note: the firstone is with anti-aliasing , the second one is not**)

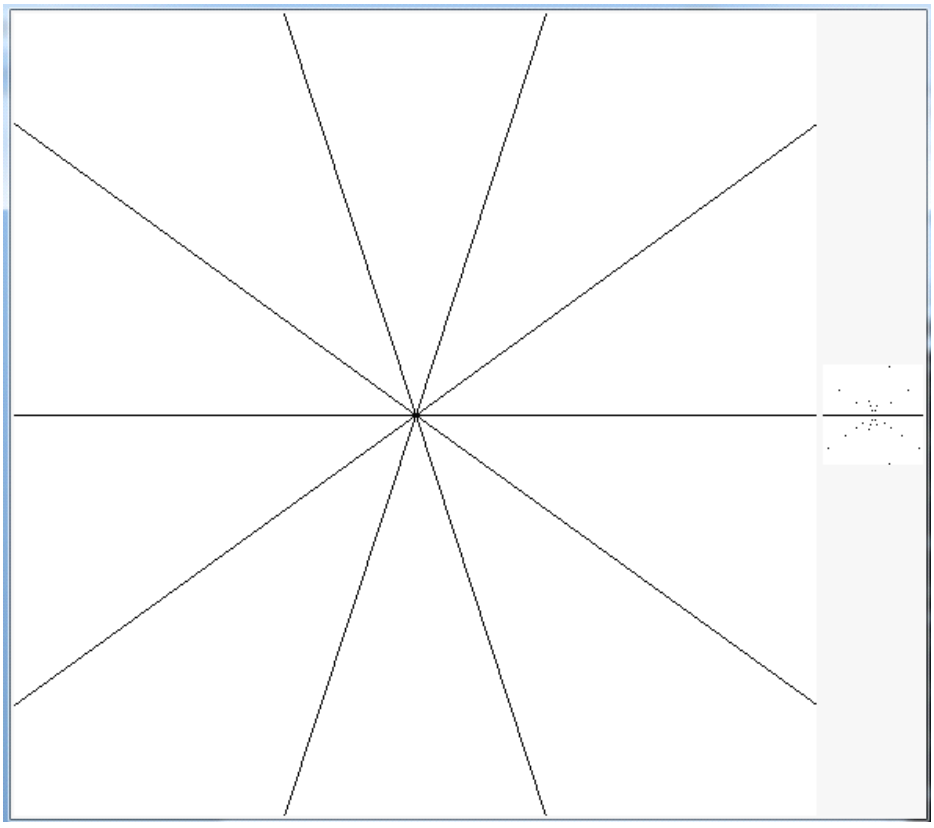




When s=8 and n=10

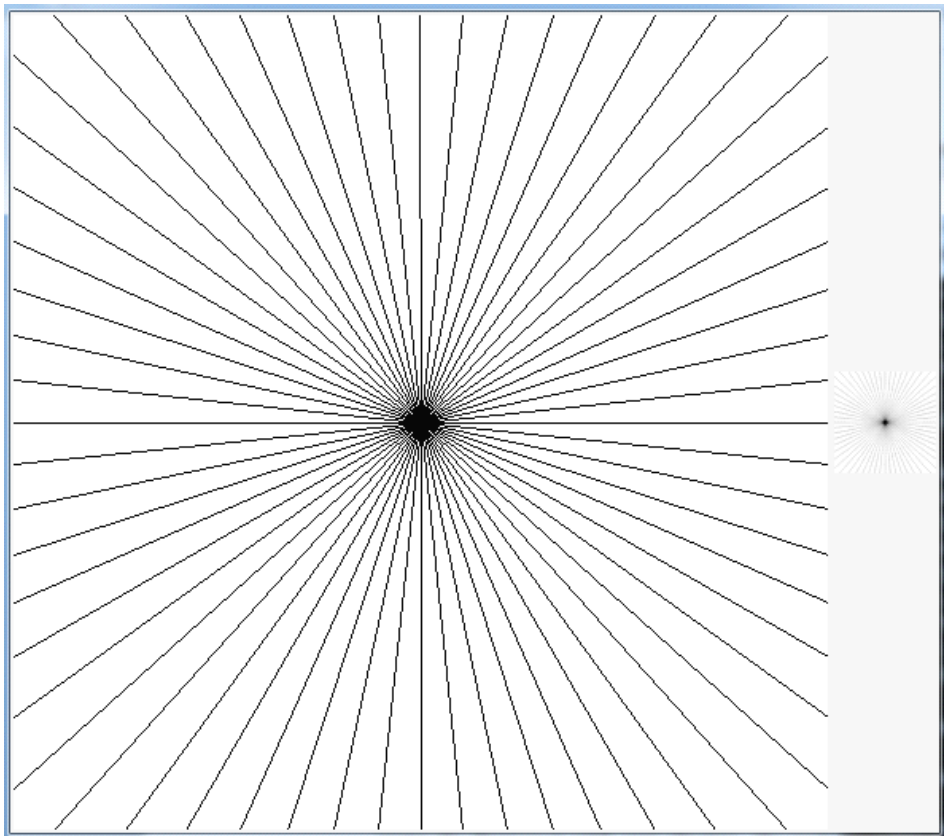
(**note: the firstone is with anti-aliasing , the second one is not**)

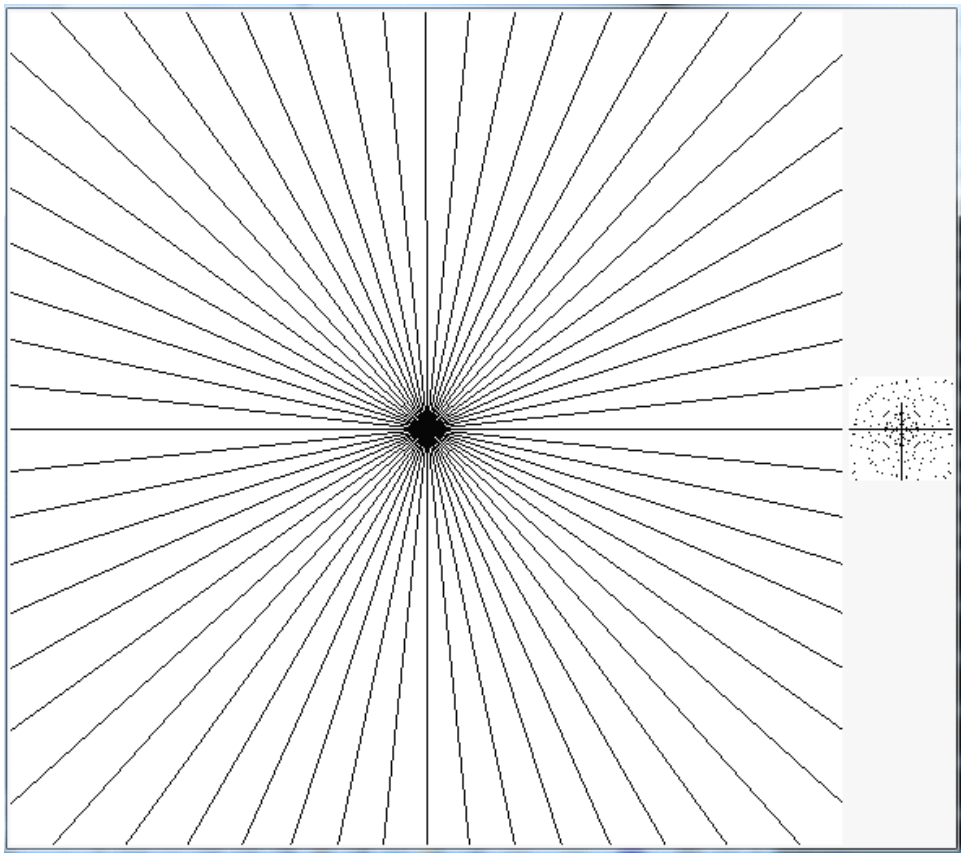




When s=8 and n=60

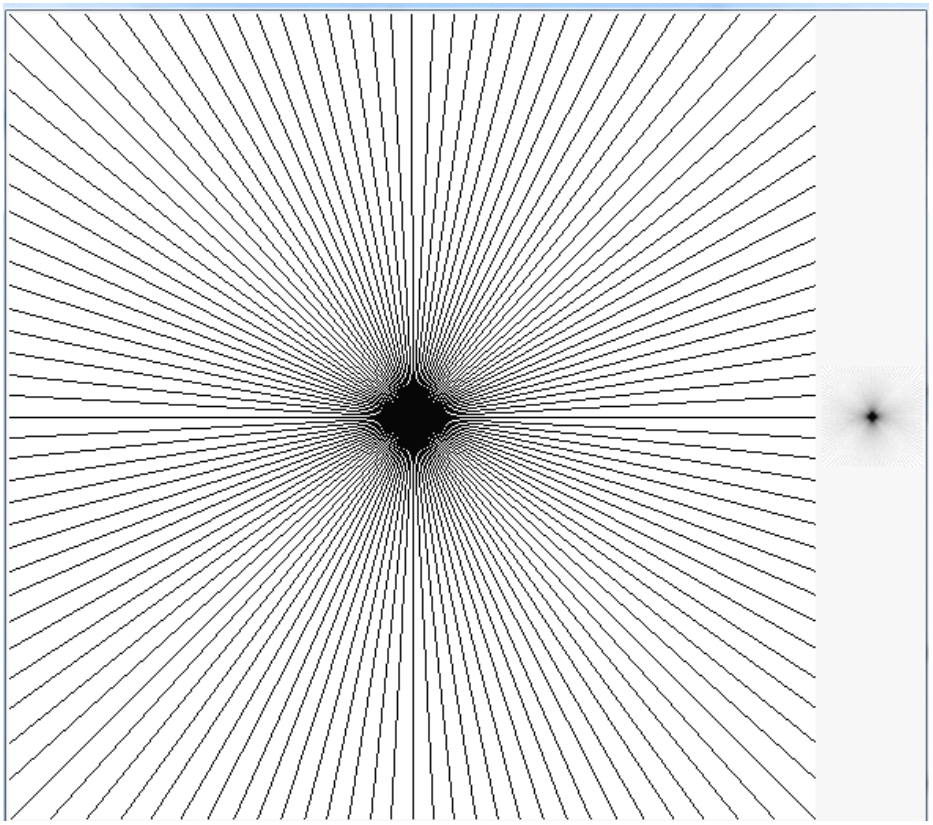
(**note: the firstone is with anti-aliasing , the second one is not**)

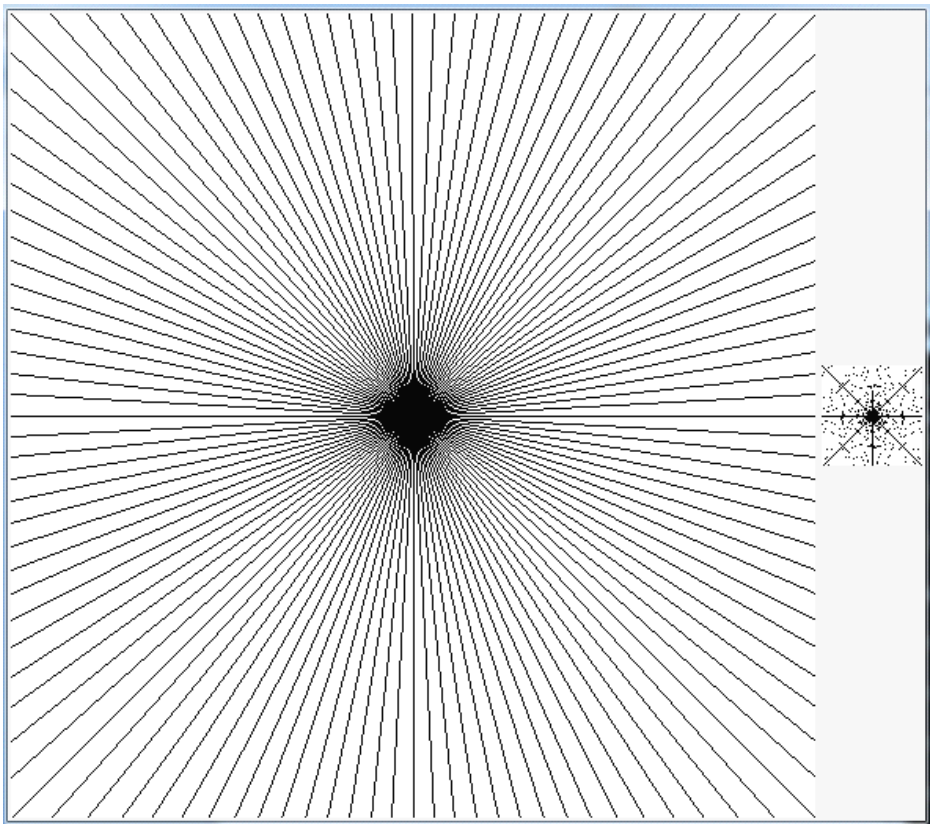




When s=8 and n=120

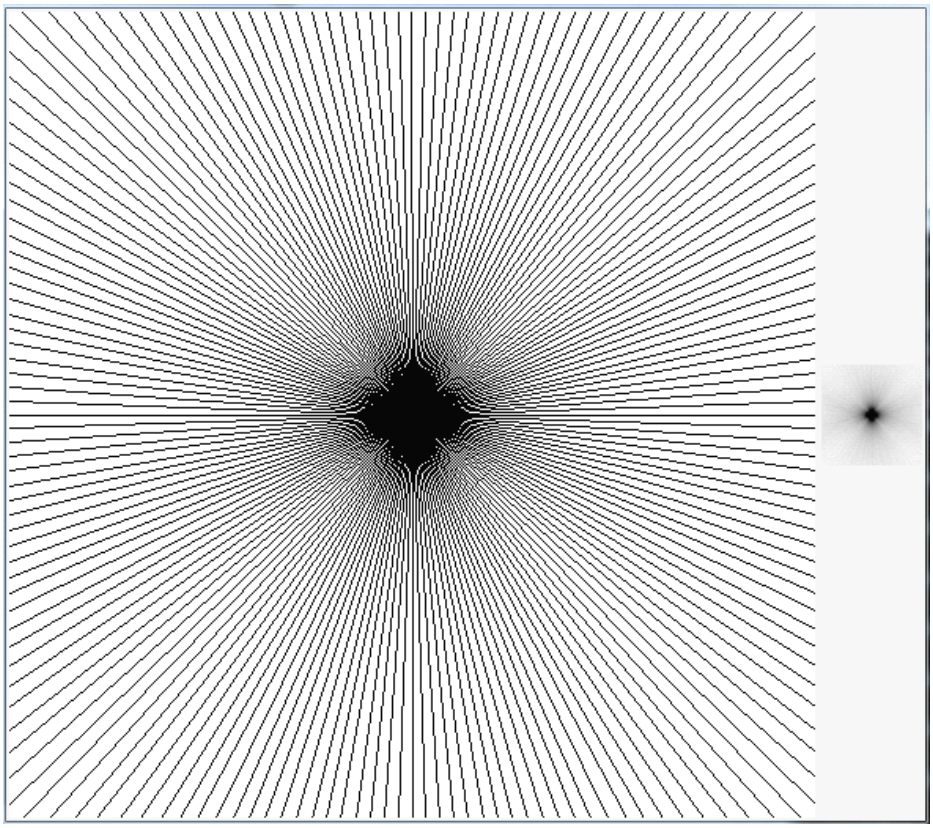
(**note: the firstone is with anti-aliasing , the second one is not**)

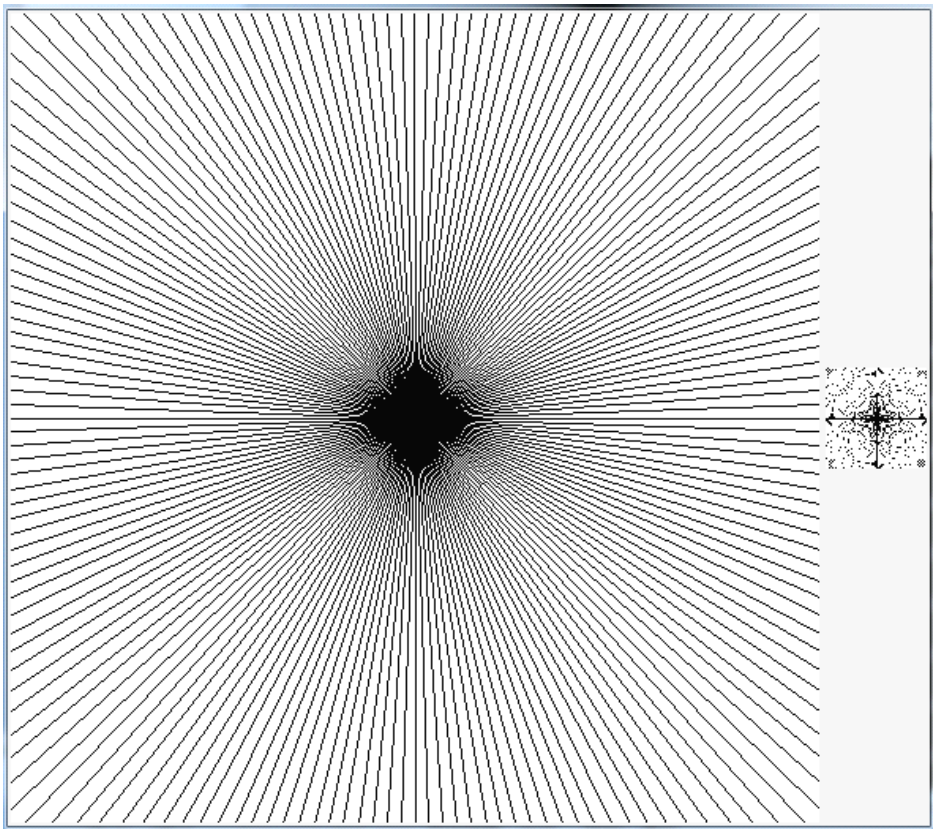




When s=8 and n=180

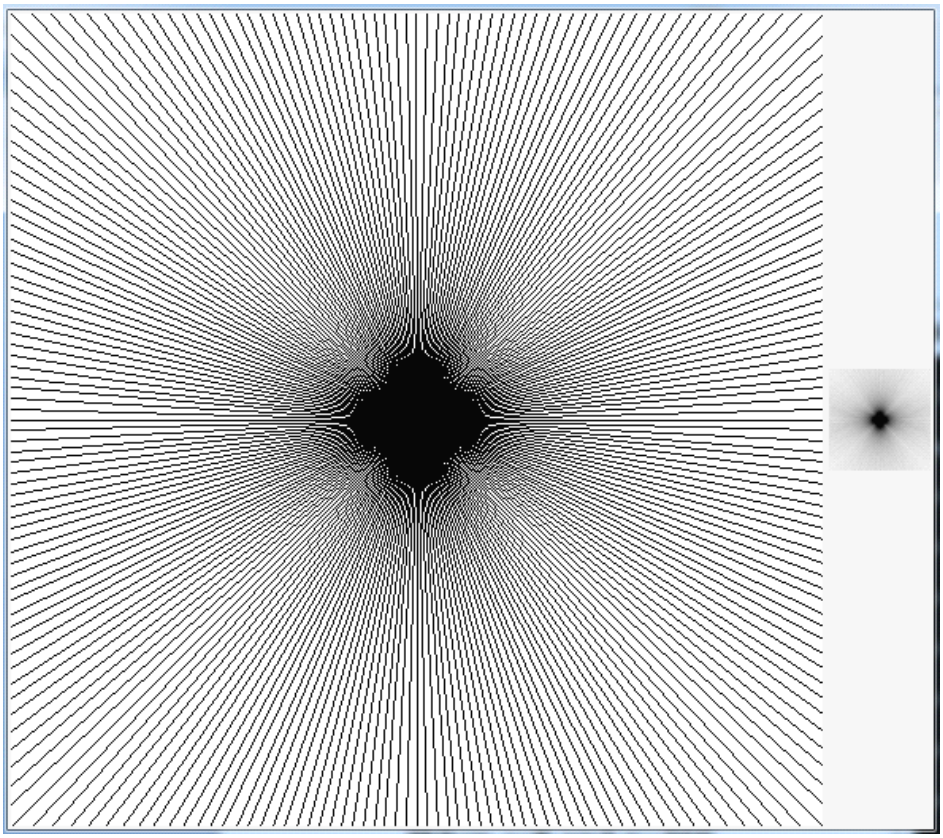
(**note: the firstone is with anti-aliasing , the second one is not**)

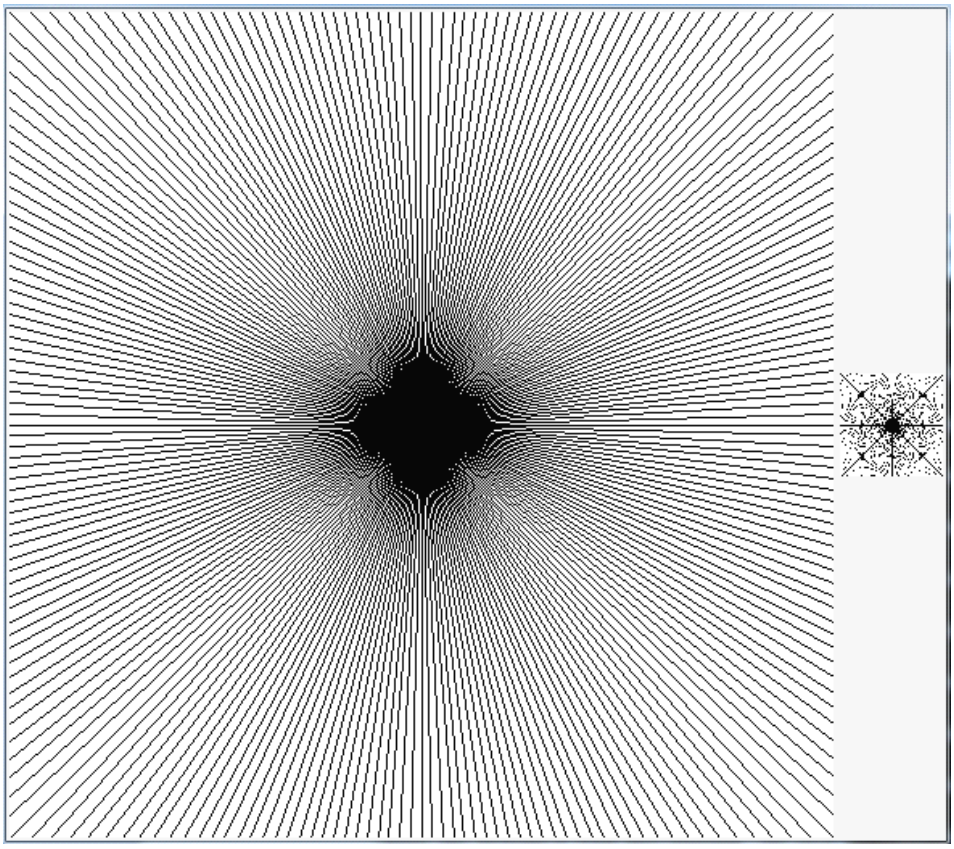




When s=8 and n=240

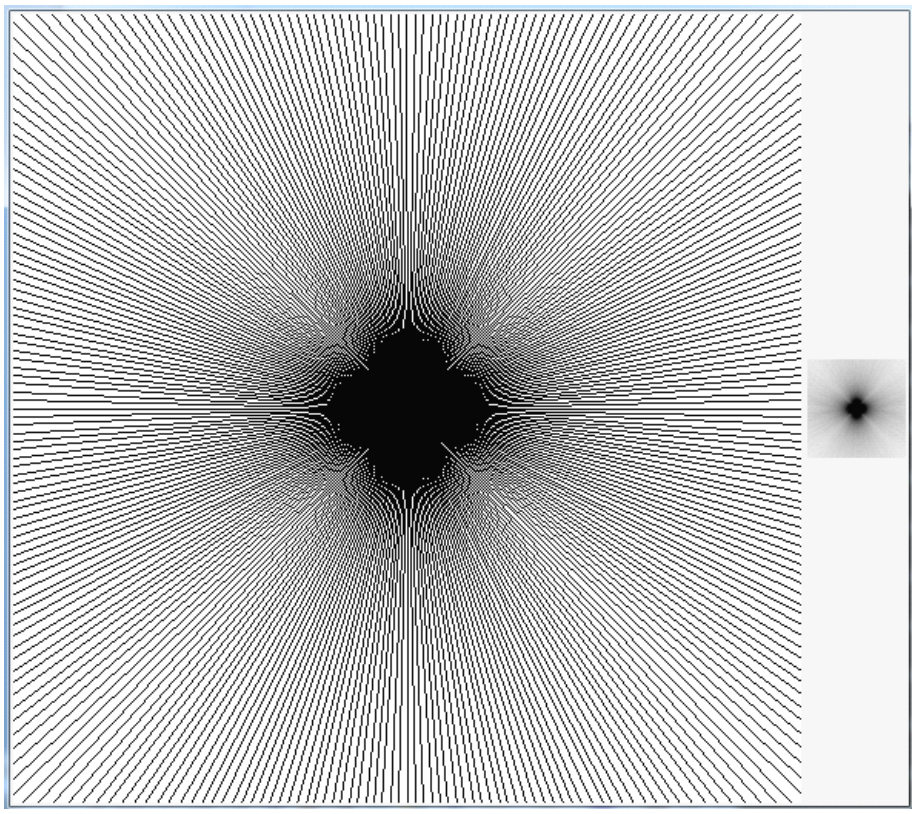
(**note: the firstone is with anti-aliasing , the second one is not**)

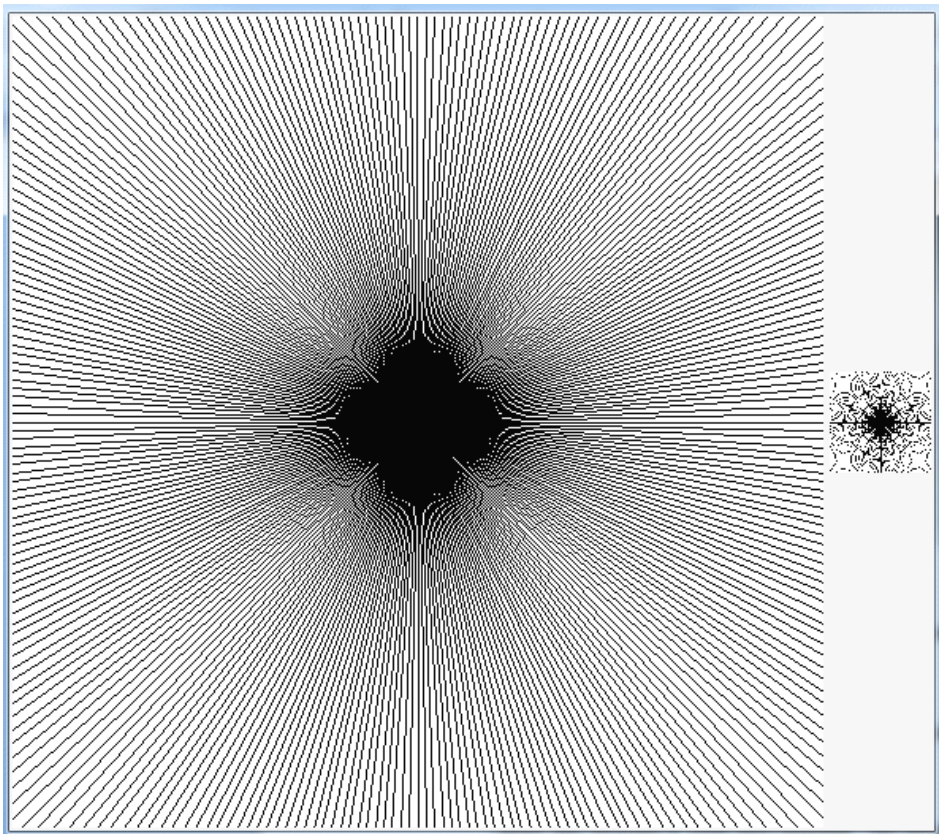




When s=8 and n=300

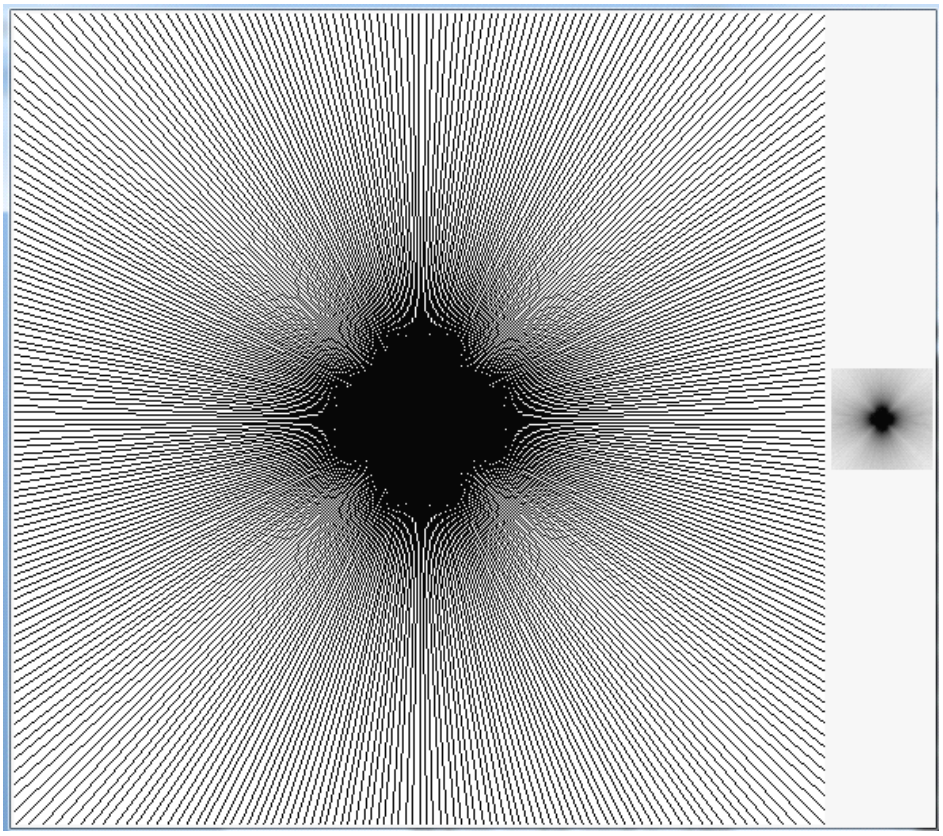
(**note: the firstone is with anti-aliasing , the second one is not**)

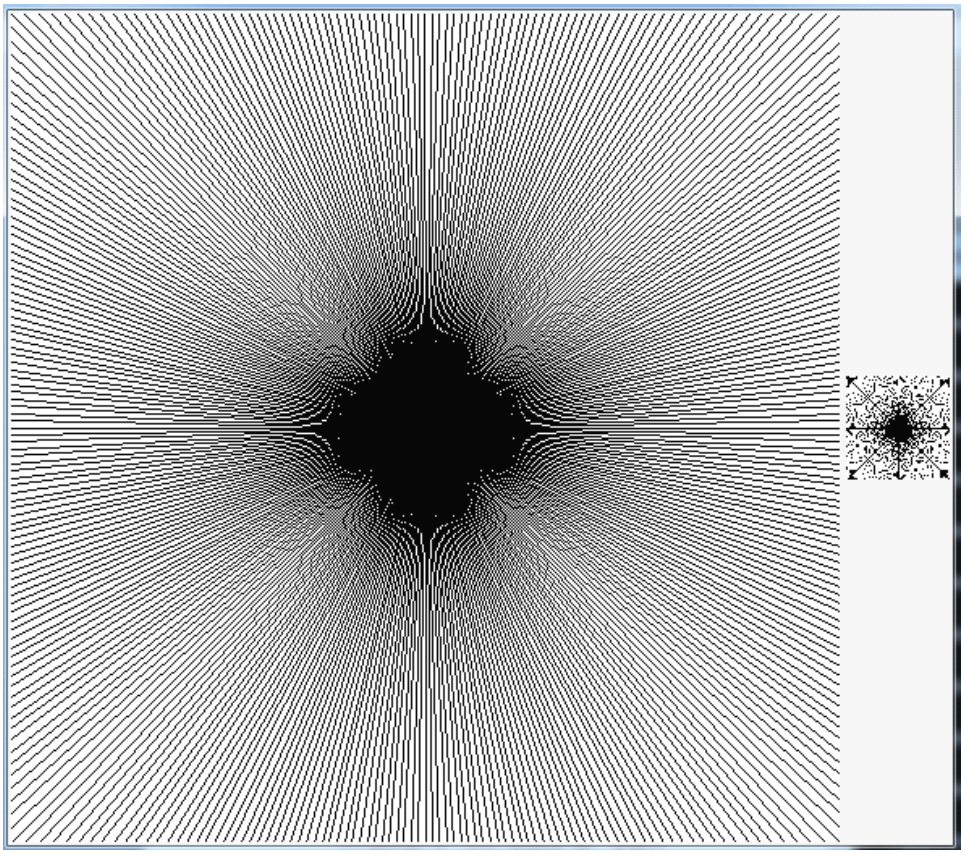




When s=8 and n=360

(**note: the firstone is with anti-aliasing , the second one is not**)





Experiment 2

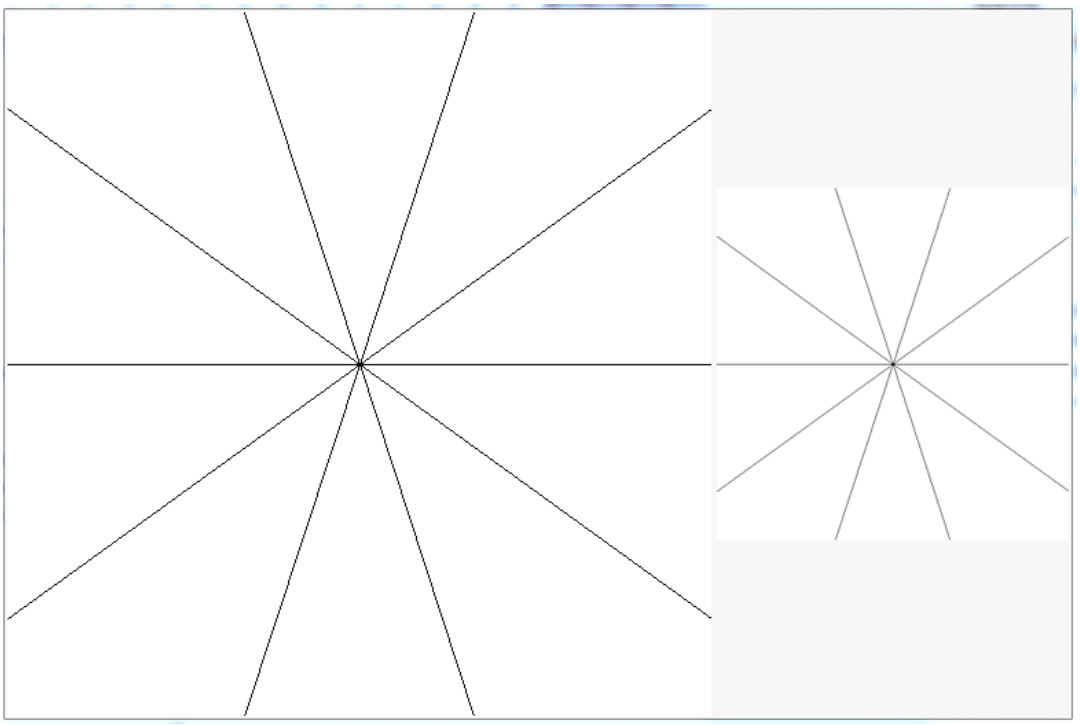
Let's try another experiment, this time keep n (number of lines) constant and varying s (scale factor). Comment on your results by using various constant values of n for changing s. You may attach results, plot charts etc. to qualify your results.

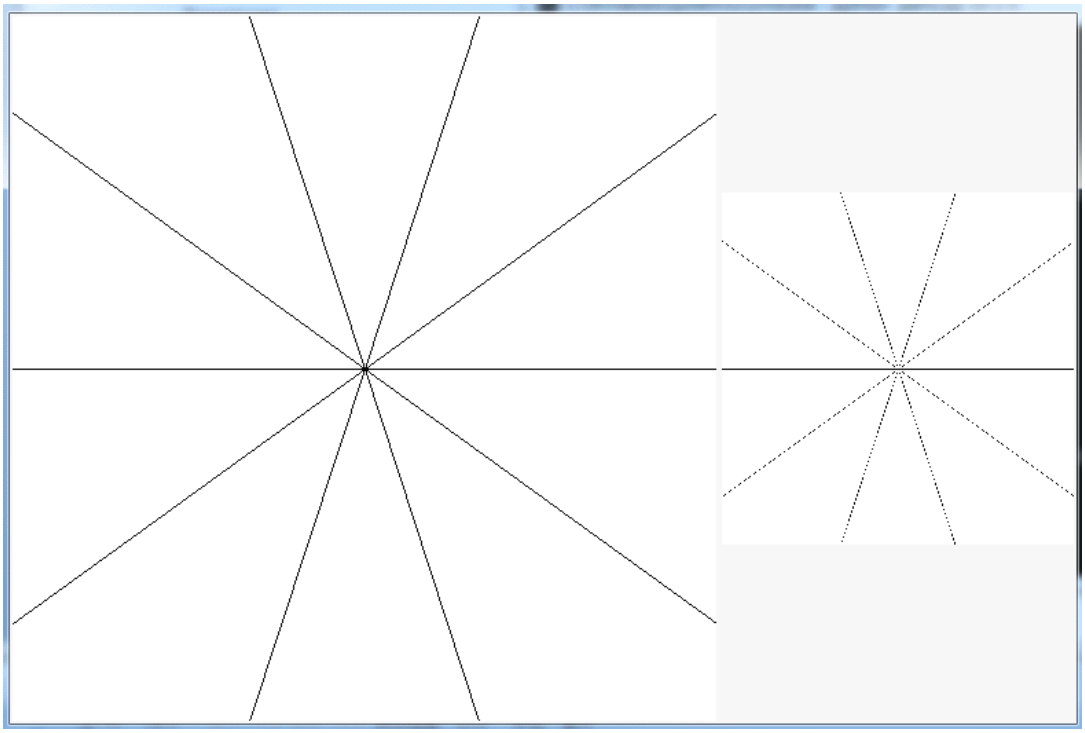
Comment for part 1 - 2:

As we can tell from the experiment result below, With the same number of lines in the image, the smaller the scaled image (which is indicated by argument s) the more it looks dislike the original one. In comparison to the simple sampling results, the anti-aliasing results render much better effect, the ripples and those break-points within lines do not exist any more, therefore the scaled image looks more alike its source.

When s=2 and n=10

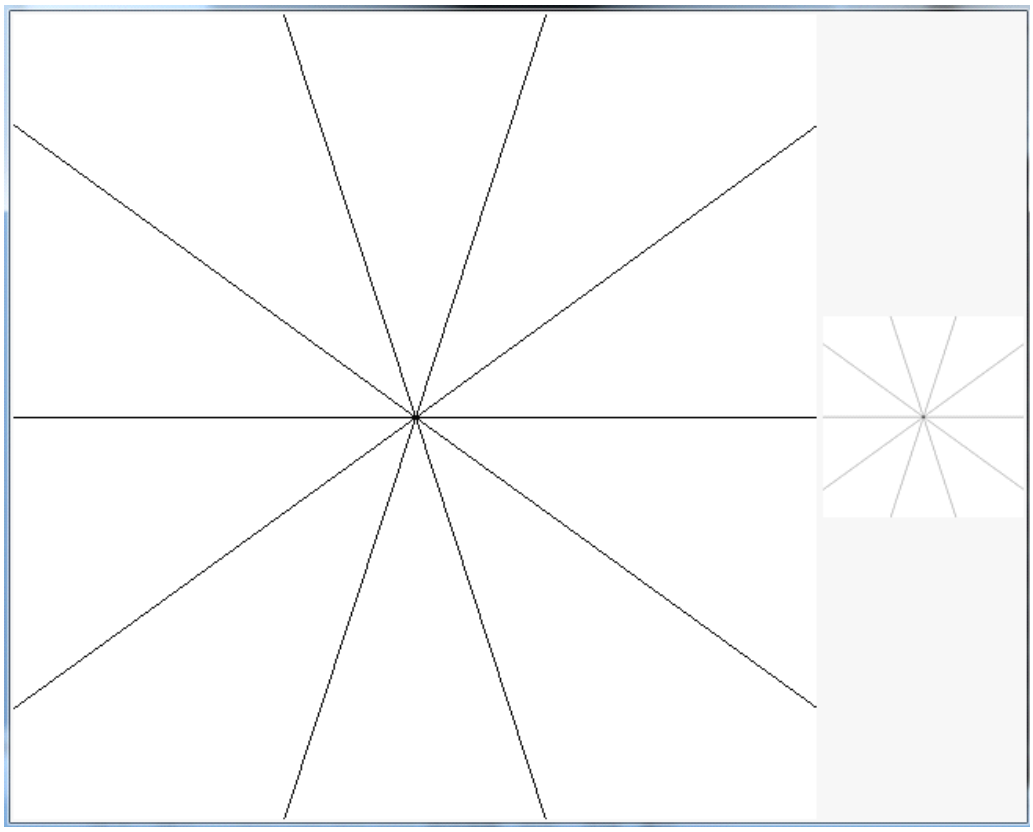
(**note: the firstone is with anti-aliasing , the second one is not**)

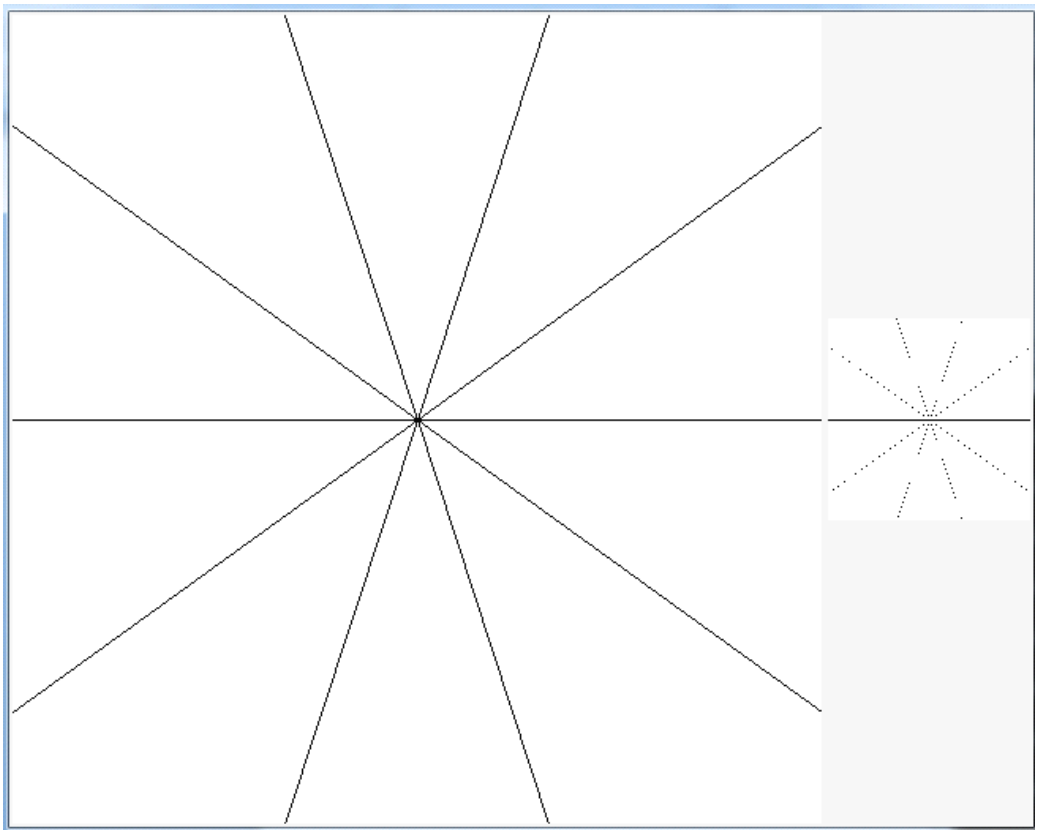




When s=4 and n=10

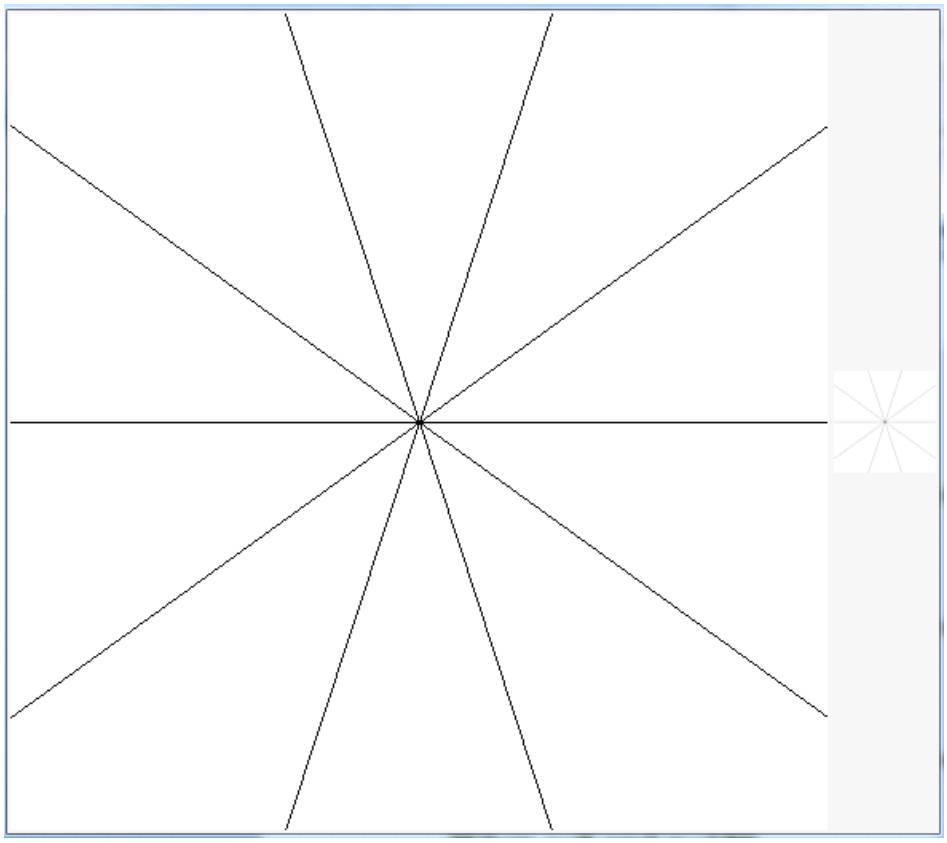
(**note: the firstone is with anti-aliasing , the second one is not**)

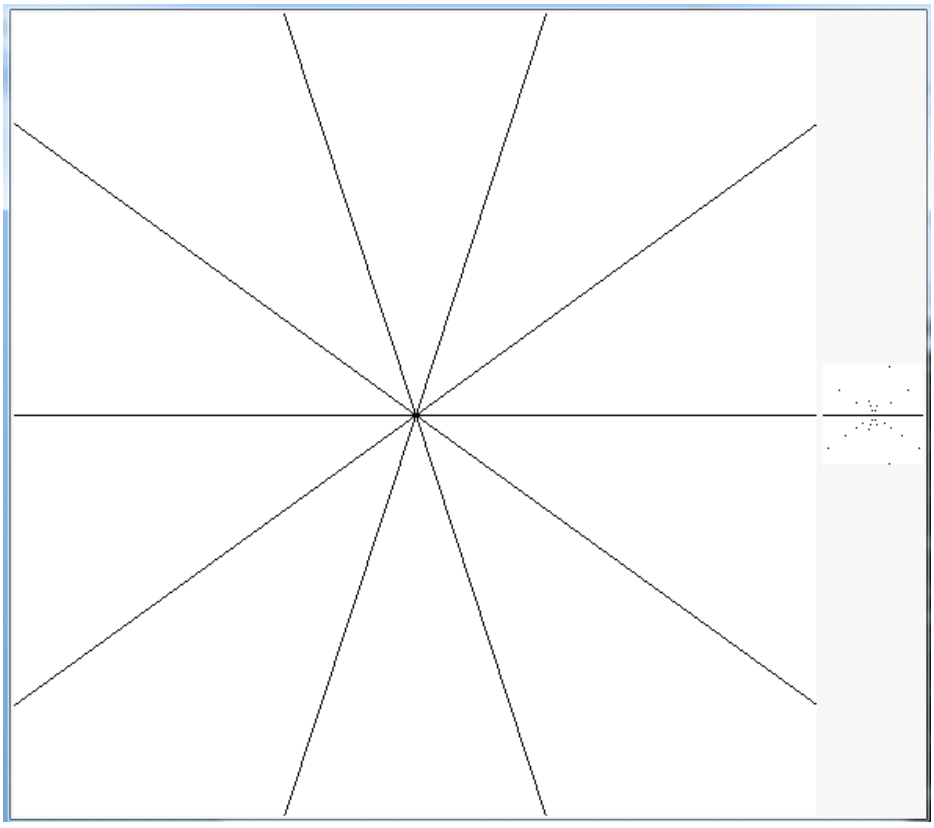




When s=8 and n=10

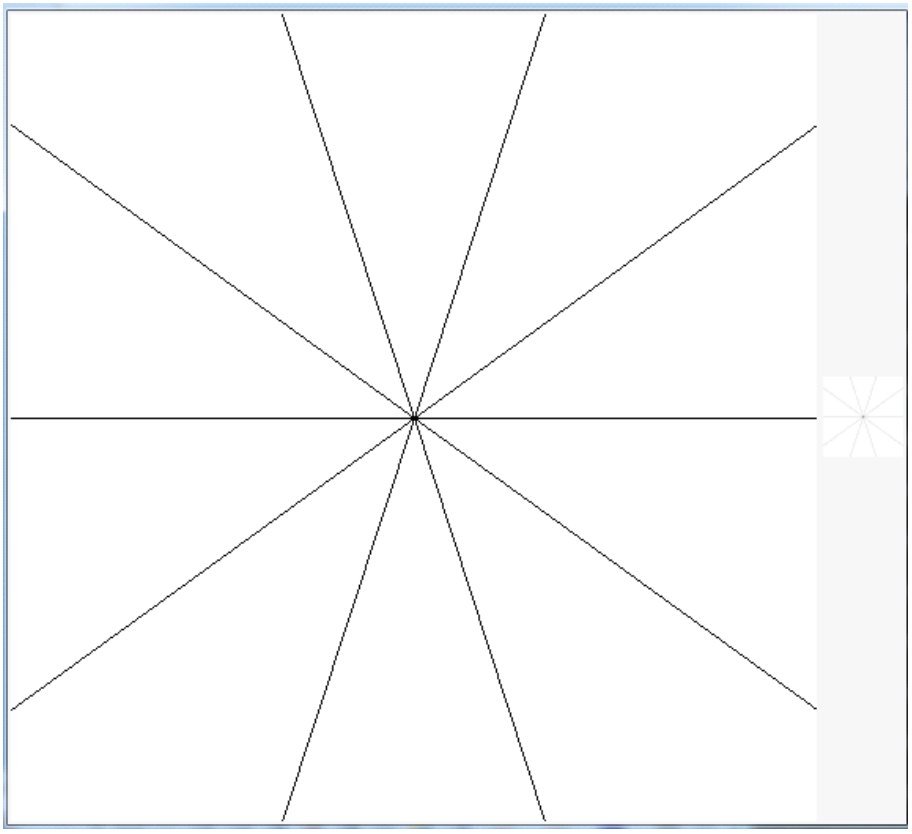
(**note: the firstone is with anti-aliasing , the second one is not**)

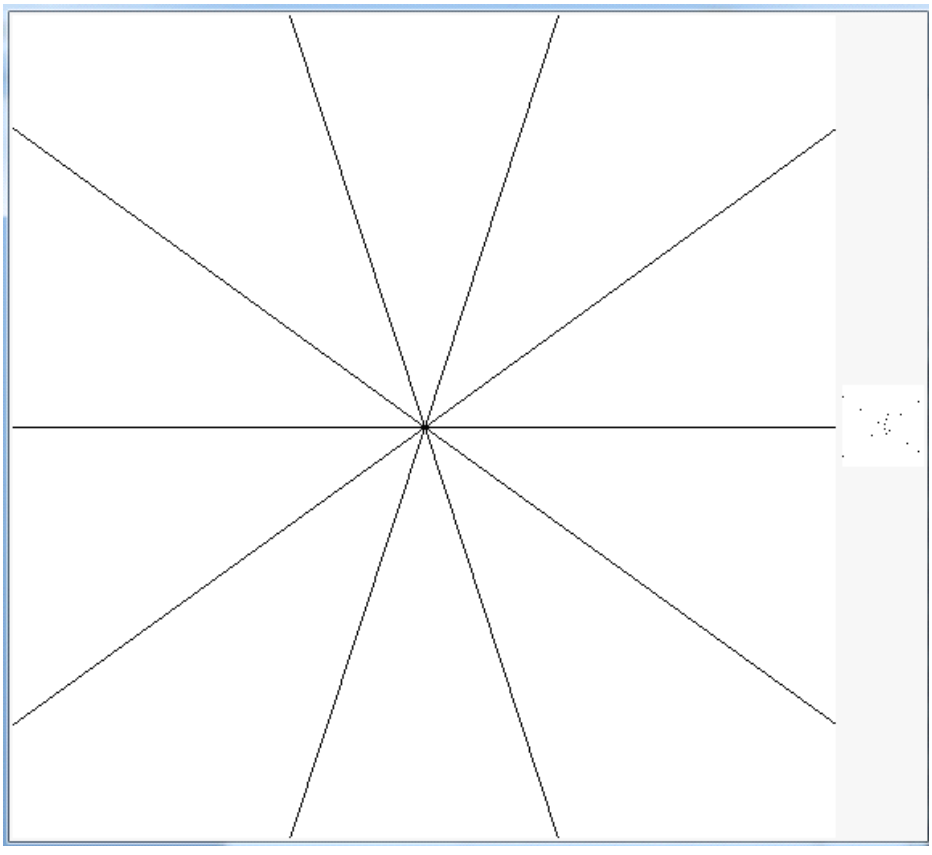




When s=10 and n=10

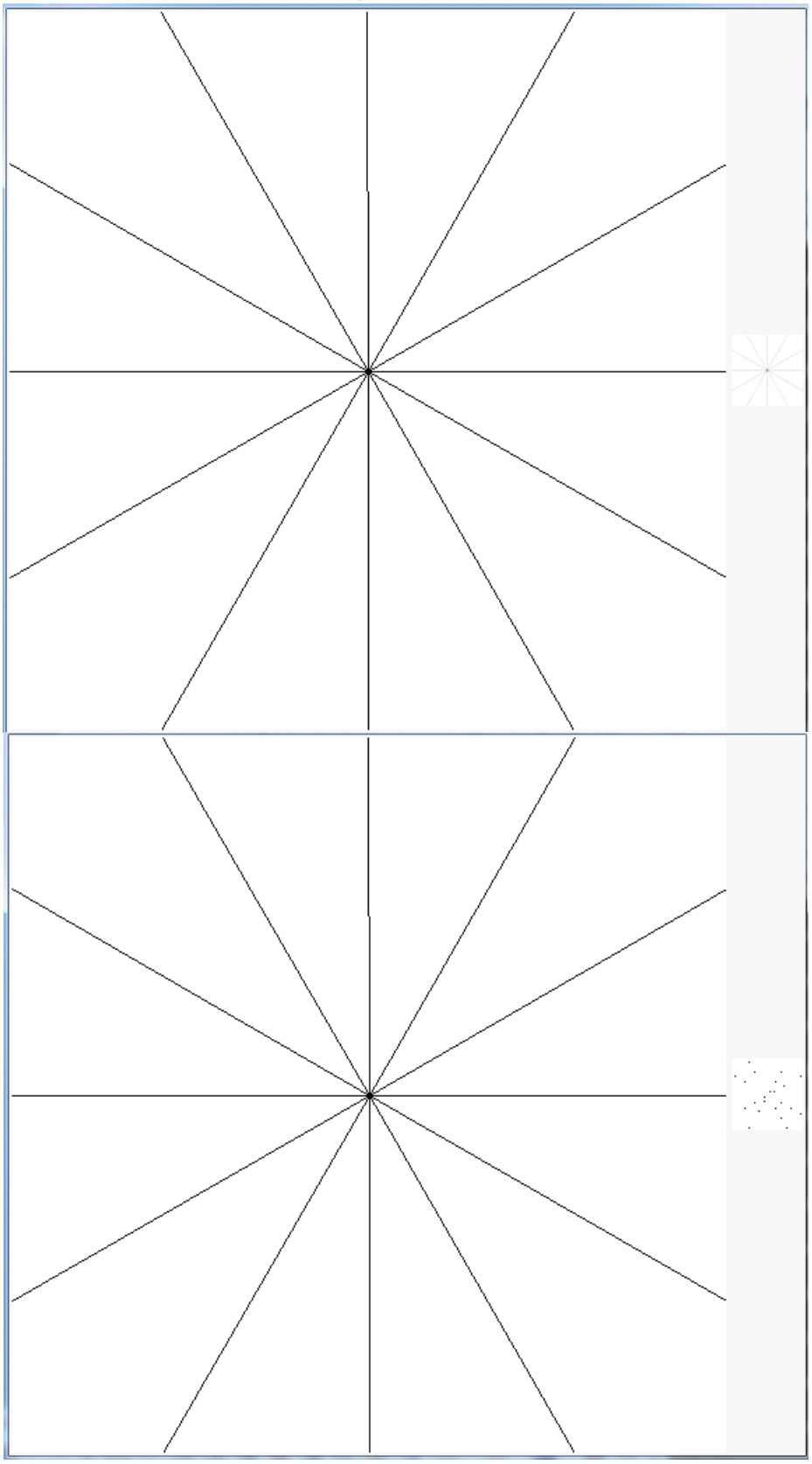
(**note: the firstone is with anti-aliasing , the second one is not**)





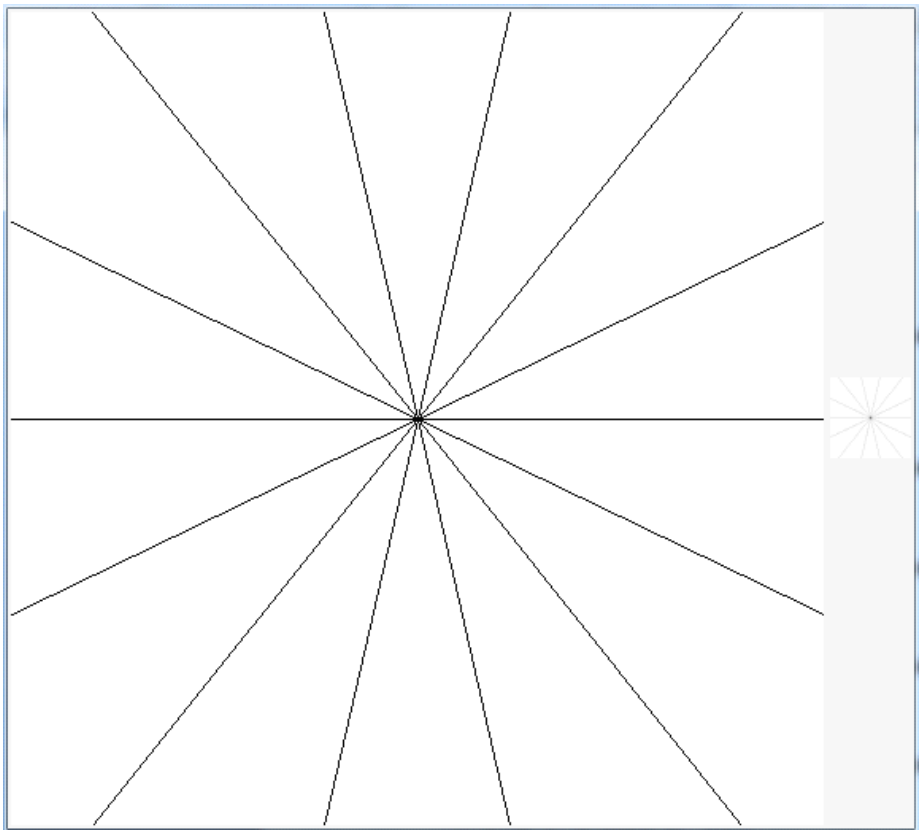
When s=12 and n=10

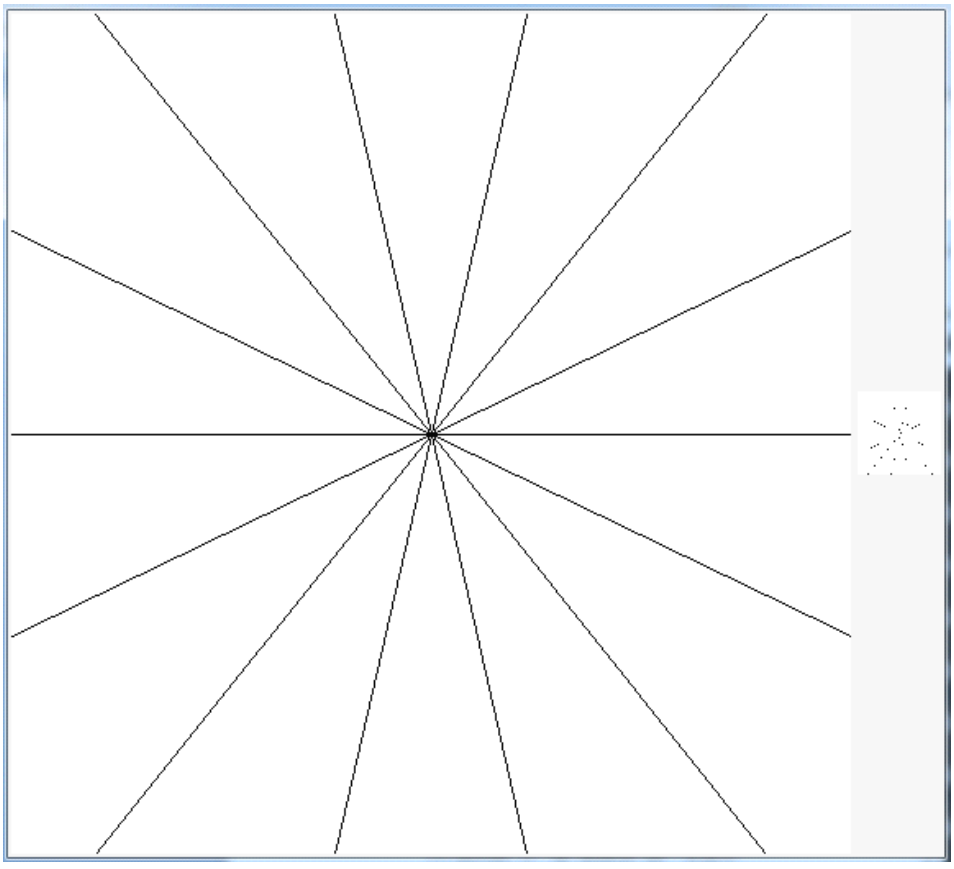
(**note: the firstone is with anti-aliasing , the second one is not**)



When s=14 and n=10

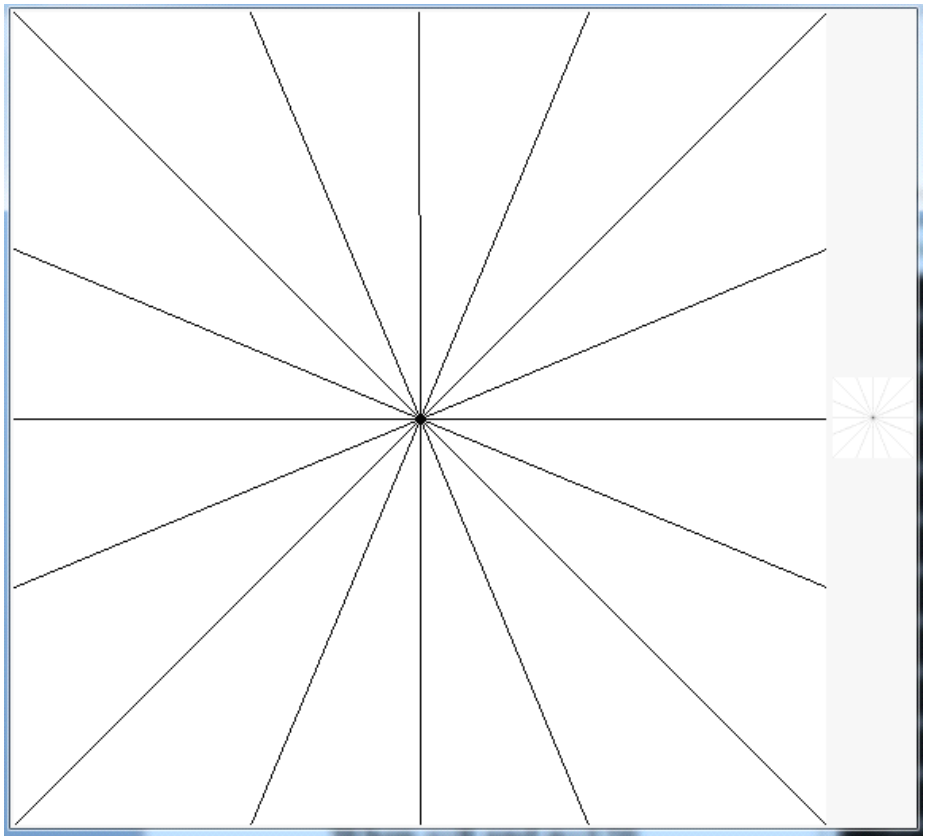
(**note: the firstone is with anti-aliasing , the second one is not**)

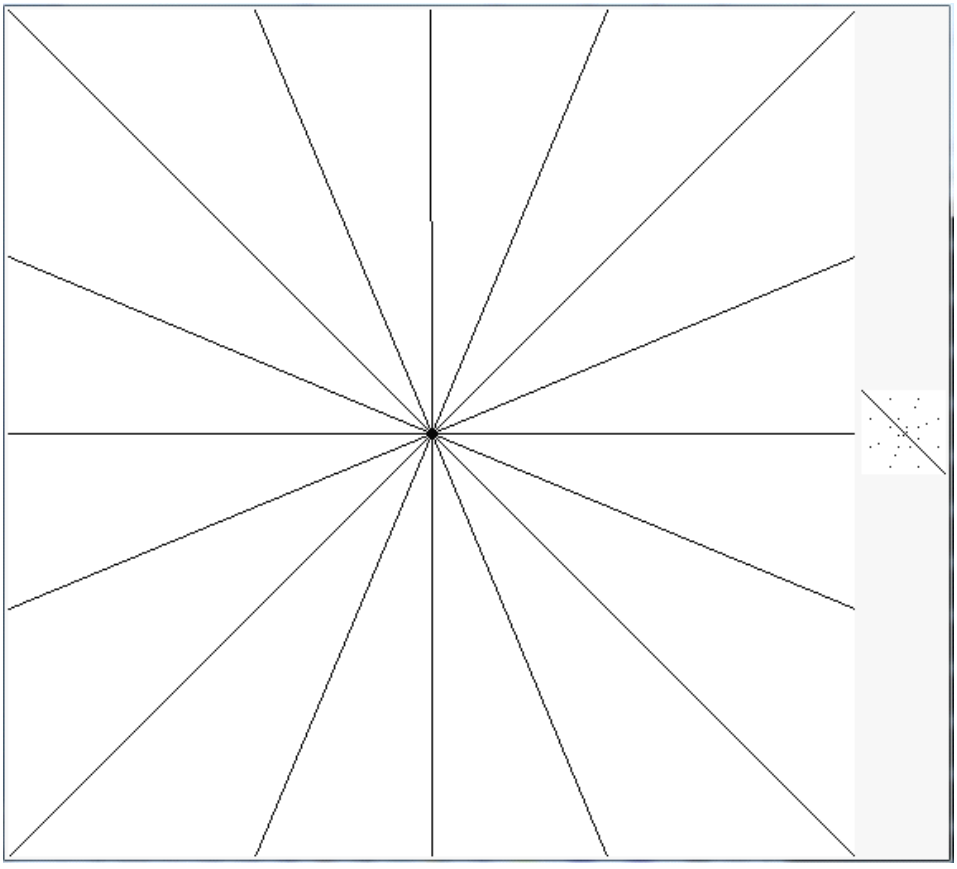




When s=16 and n=10

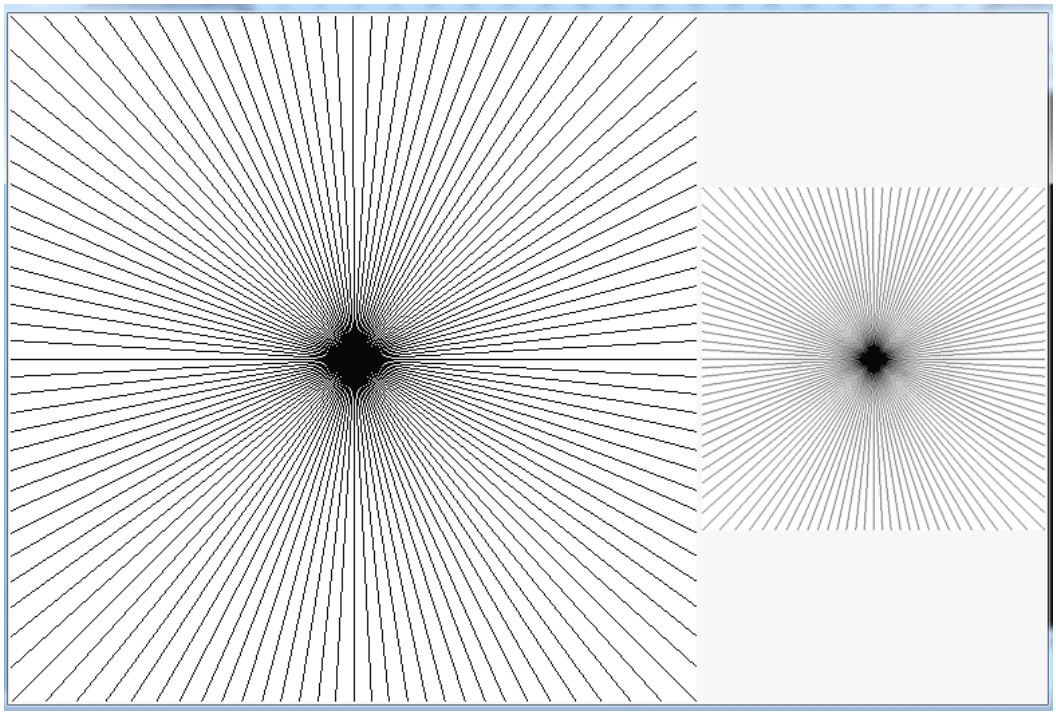
(**note: the firstone is with anti-aliasing , the second one is not**)

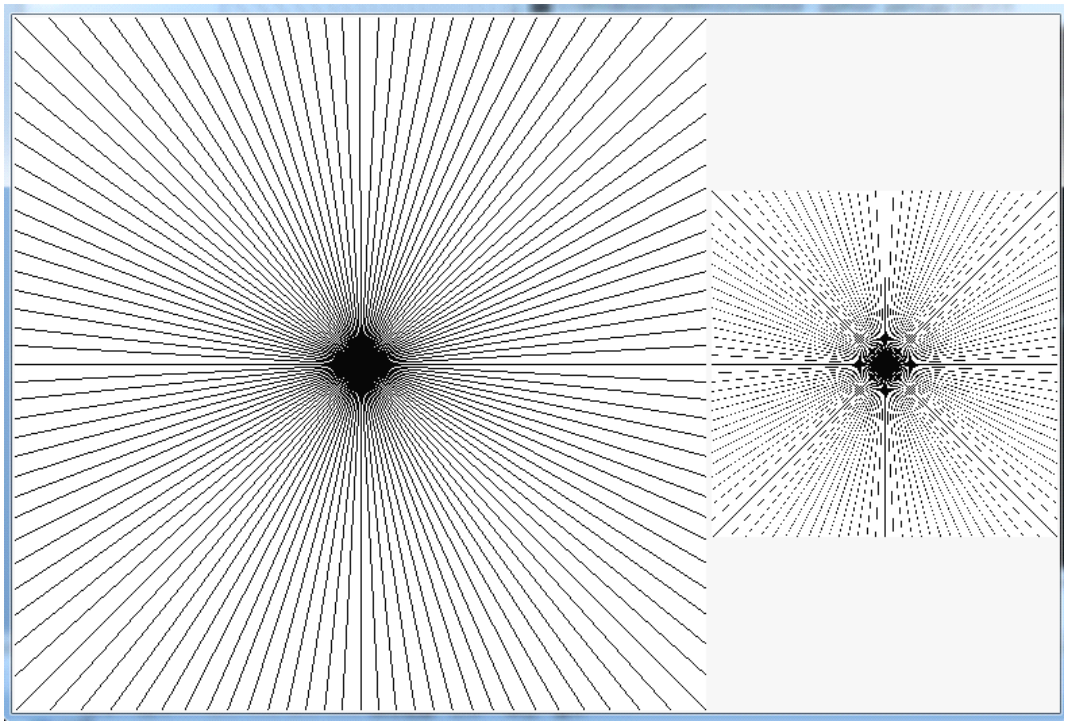




When s=2 and n=120

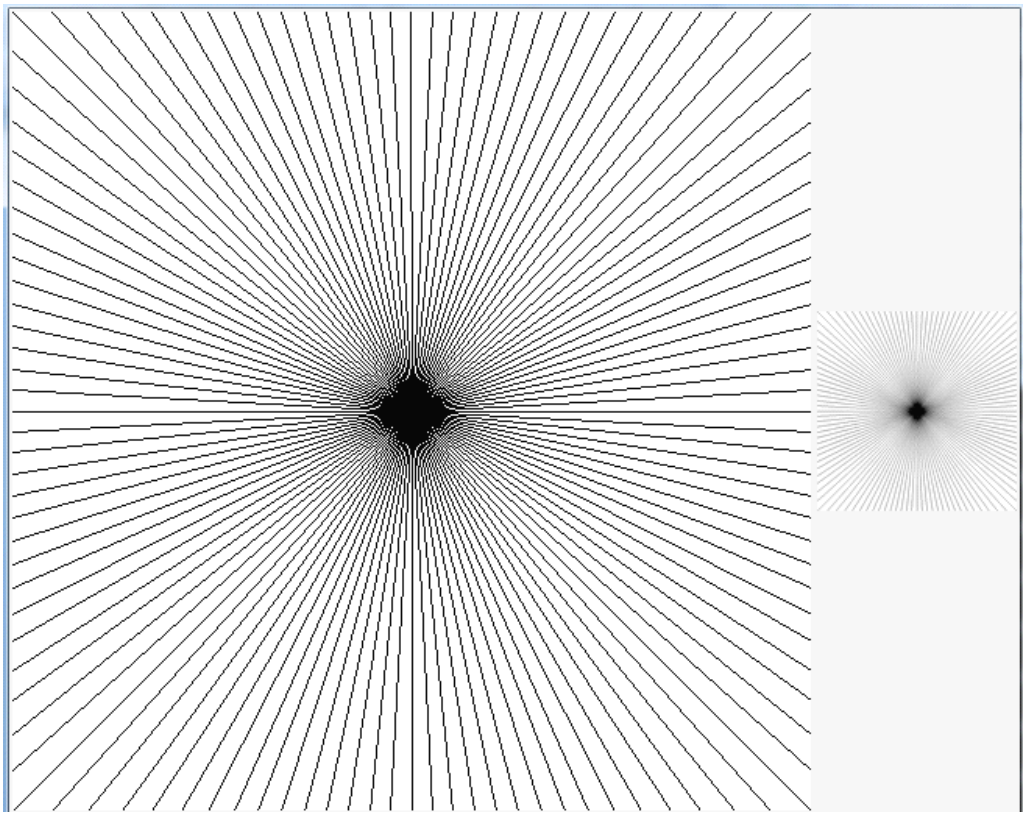
(**note: the firstone is with anti-aliasing , the second one is not**)

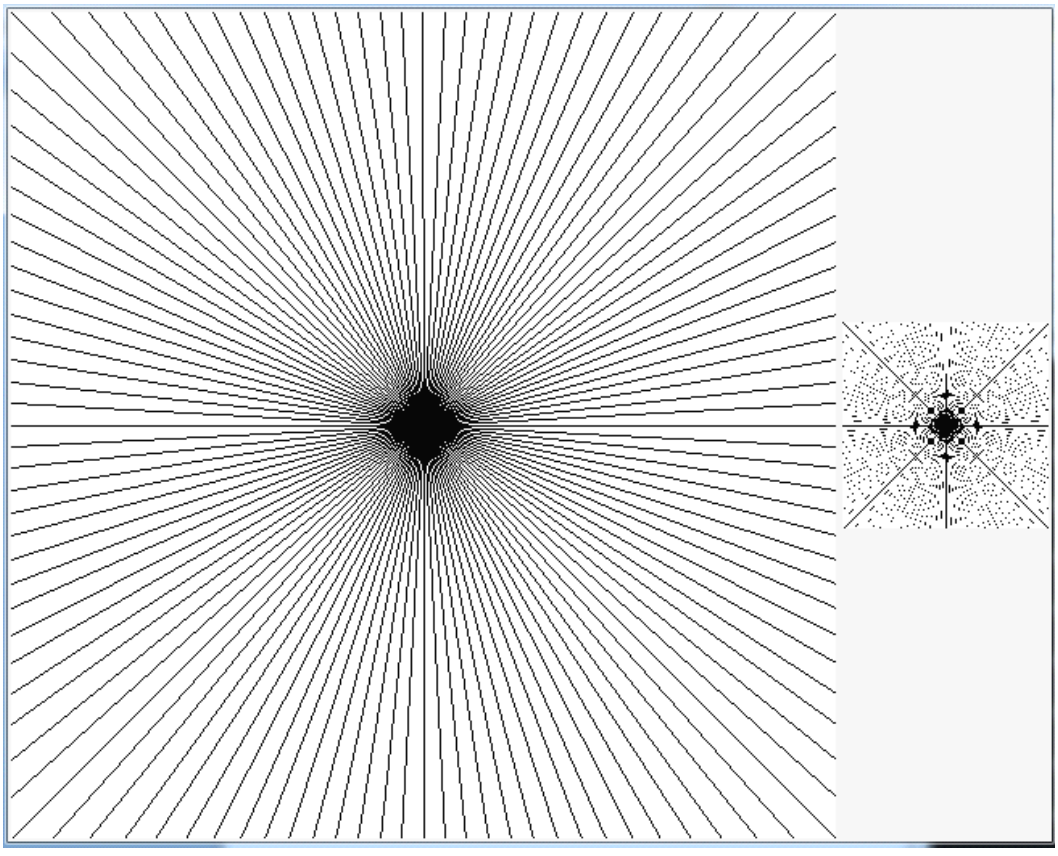




When s=4 and n=120

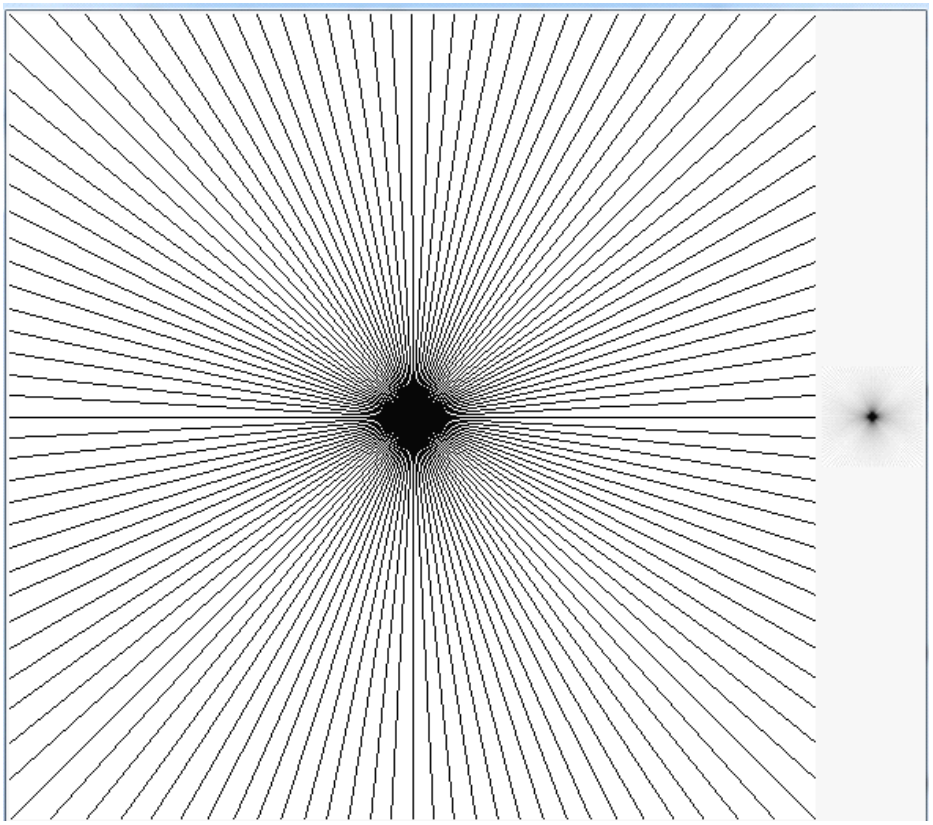
(**note: the firstone is with anti-aliasing , the second one is not**)

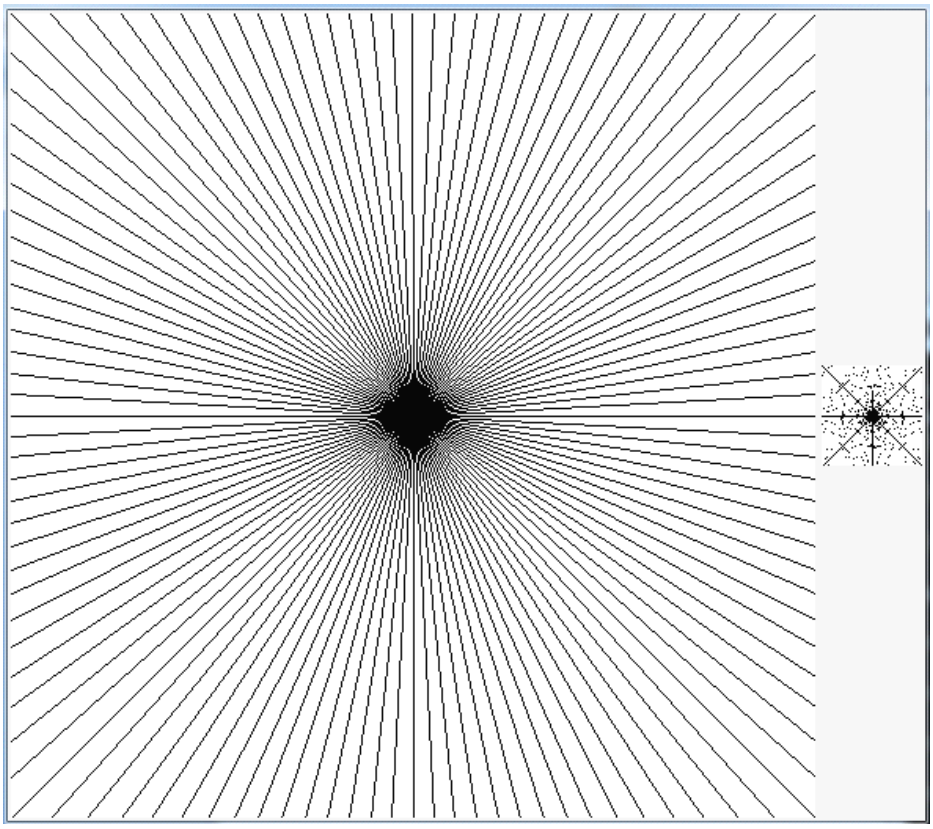




When s=8 and n=120

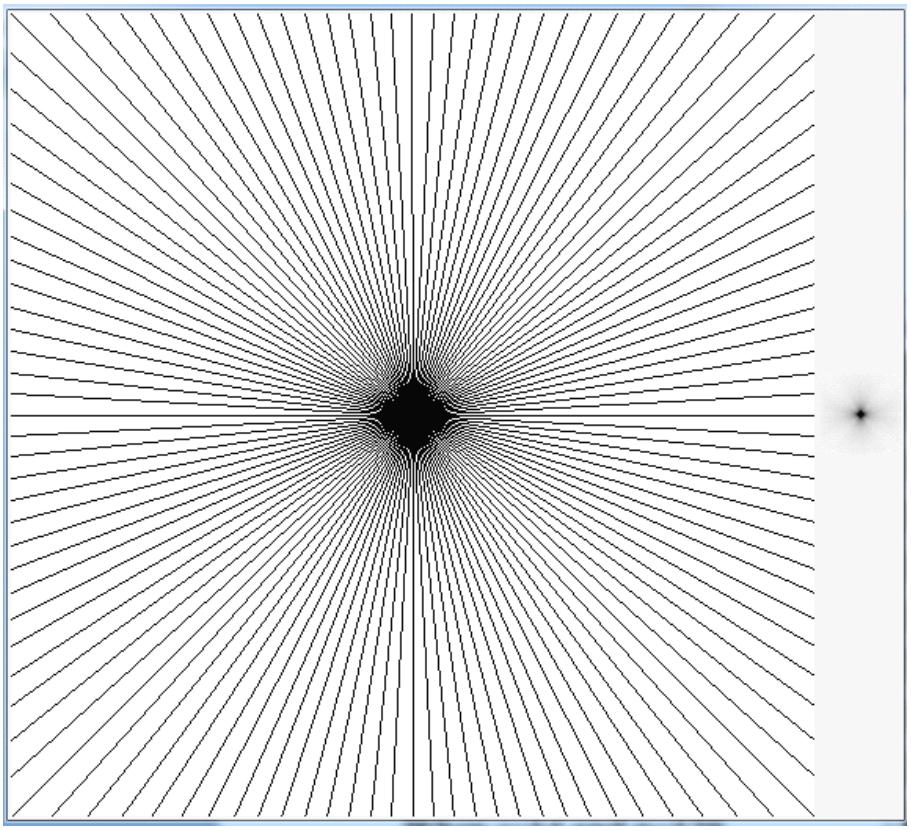
(**note: the firstone is with anti-aliasing , the second one is not**)

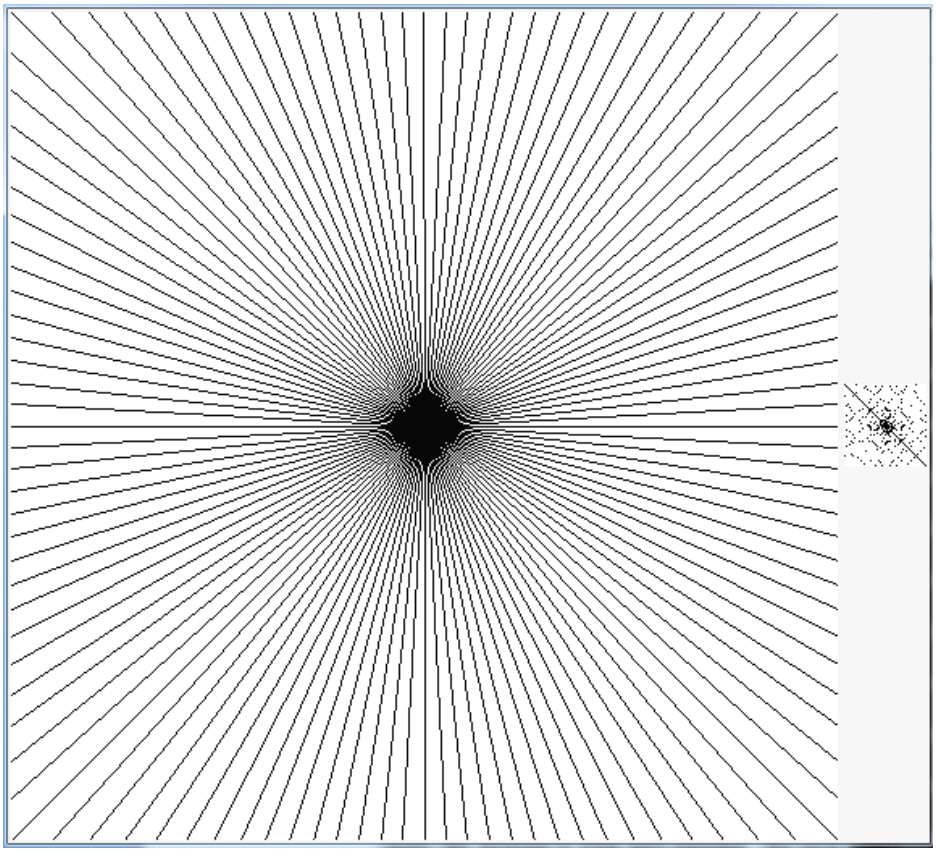




When s=10 and n=120

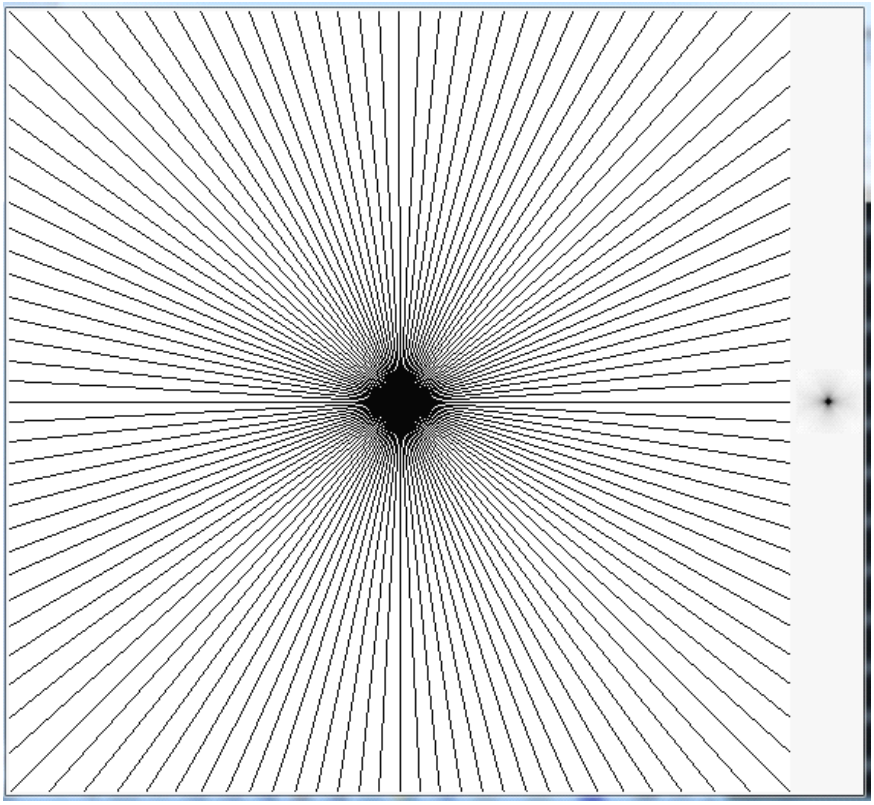
(**note: the firstone is with anti-aliasing , the second one is not**)

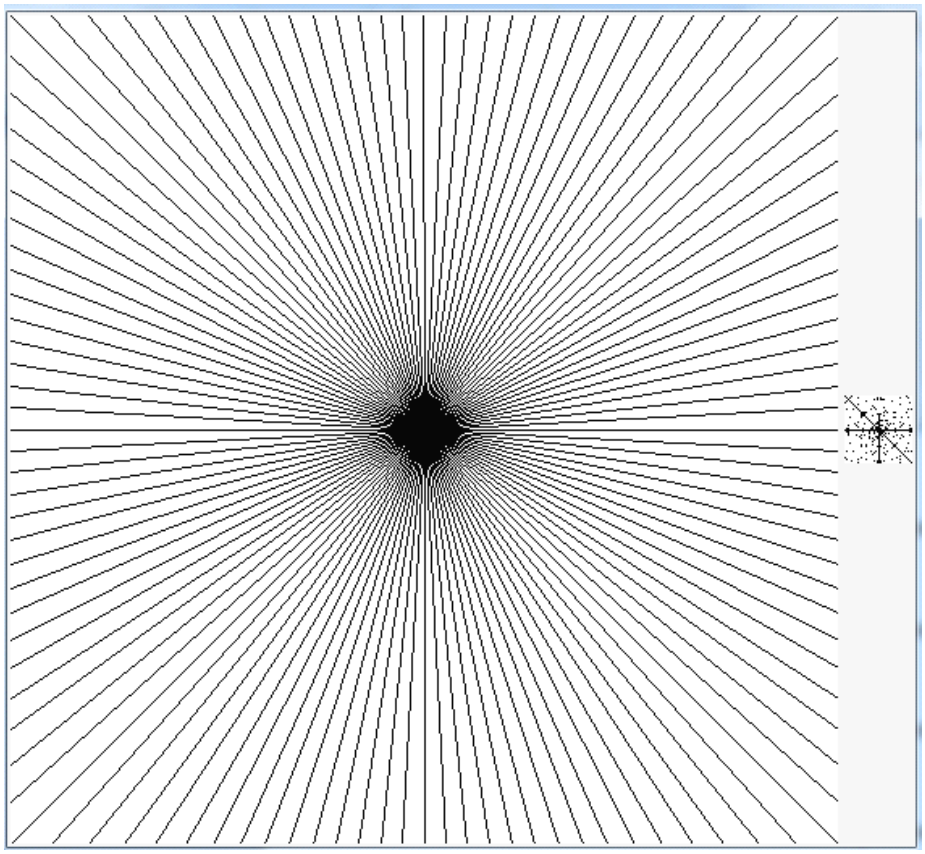




When s=12 and n=120

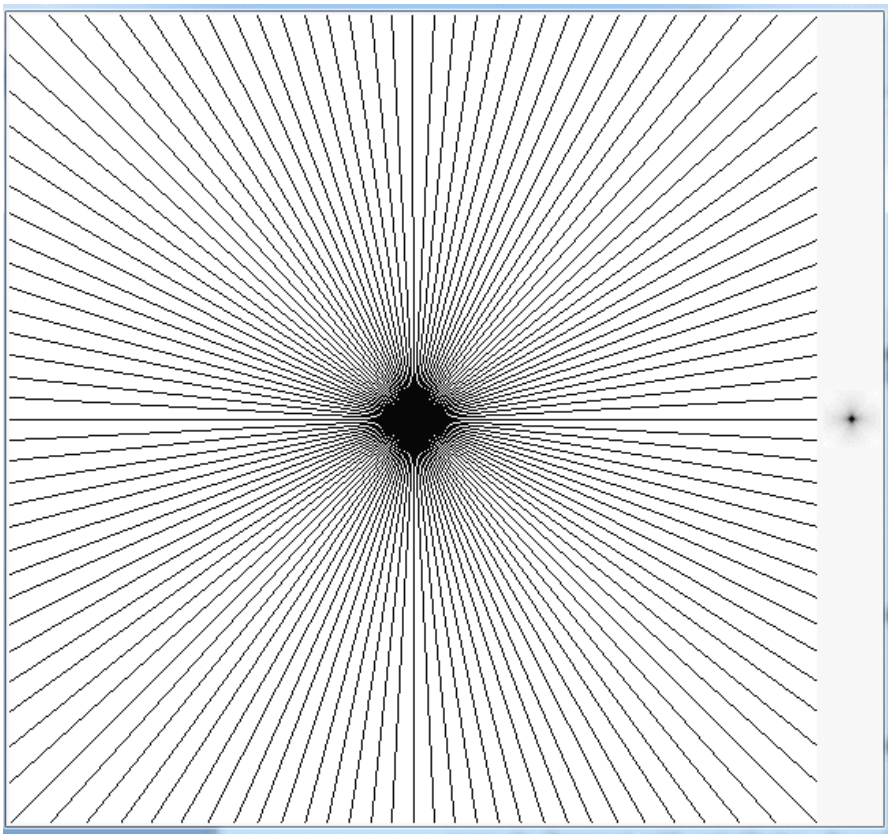
(**note: the firstone is with anti-aliasing , the second one is not**)

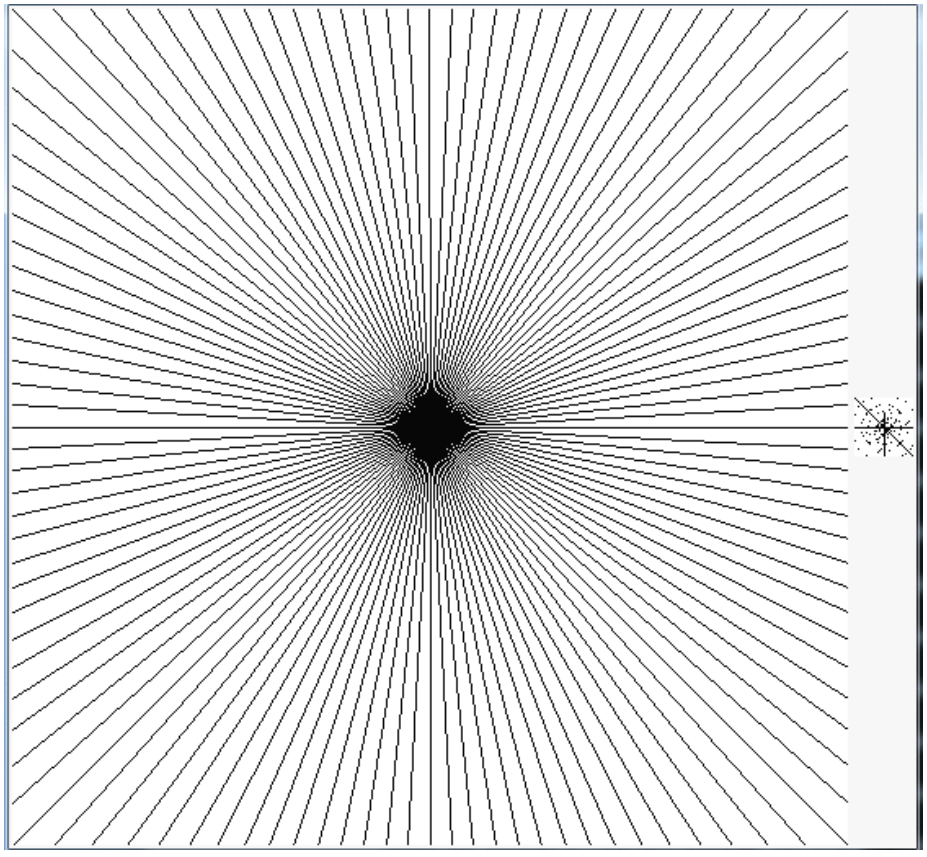




When s=14 and n=120

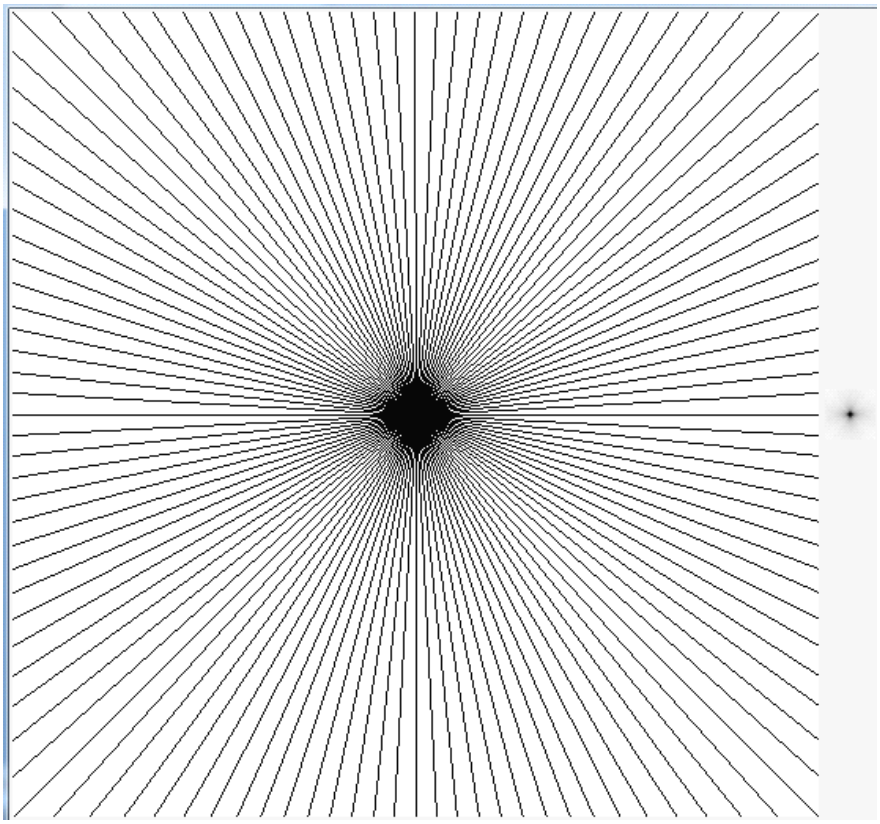
(**note: the firstone is with anti-aliasing , the second one is not**)

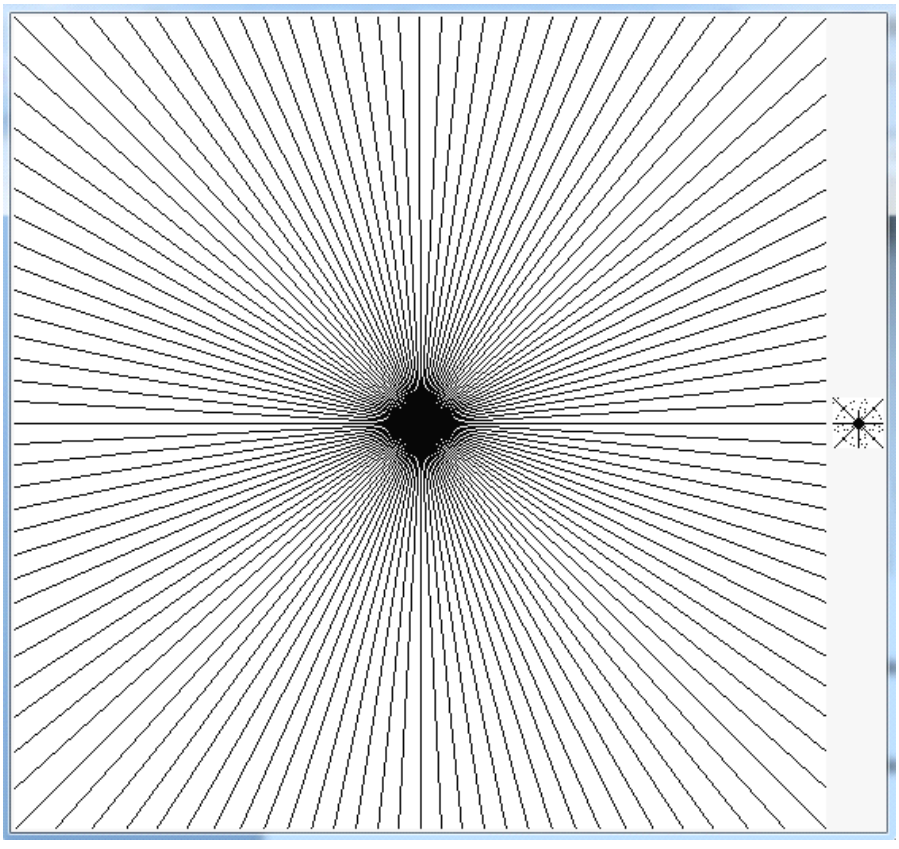




When s=16 and n=120

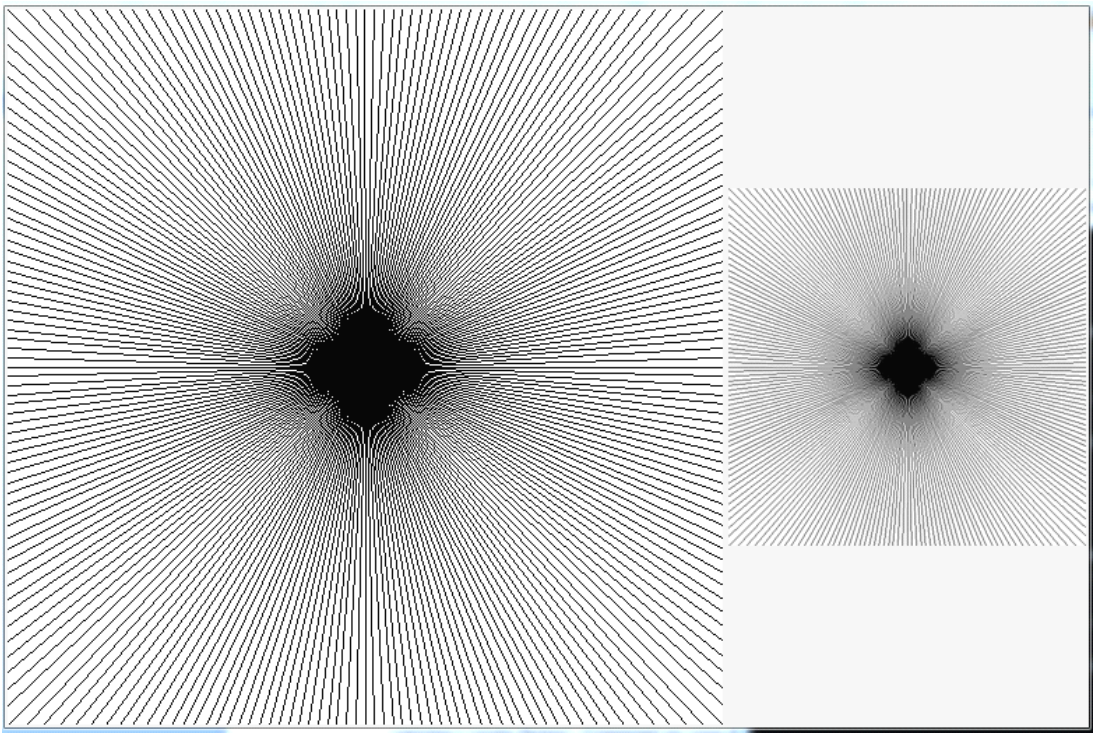
(**note: the firstone is with anti-aliasing , the second one is not**)

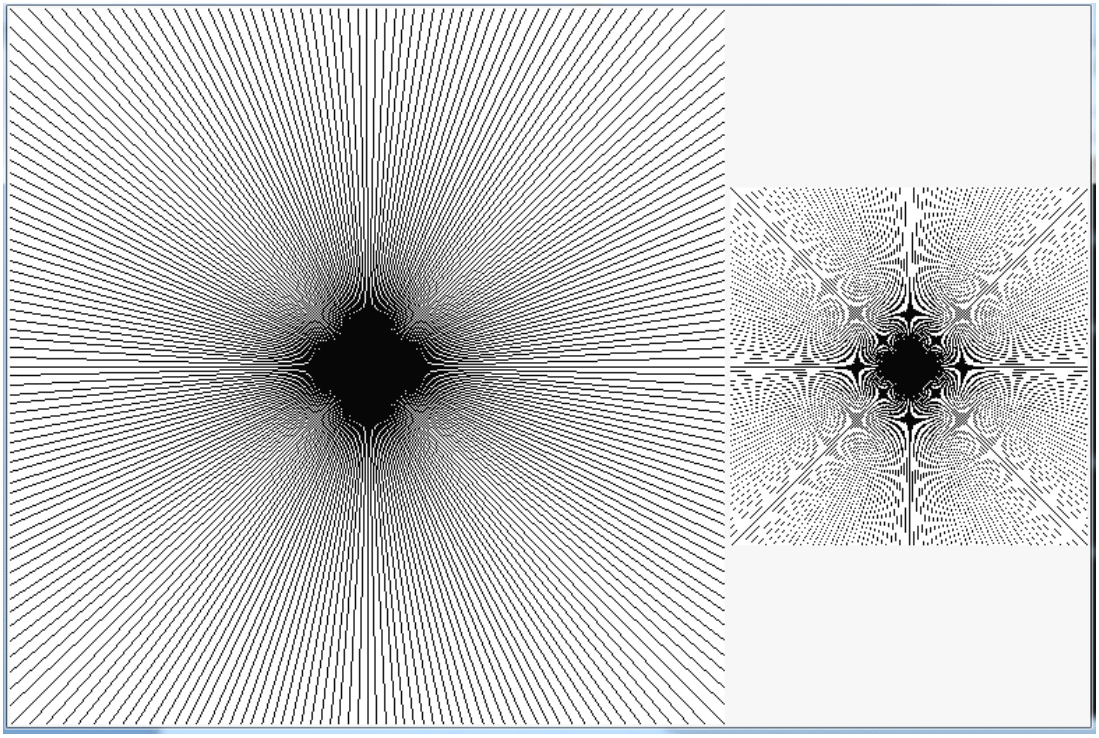




When s=2 and n=240

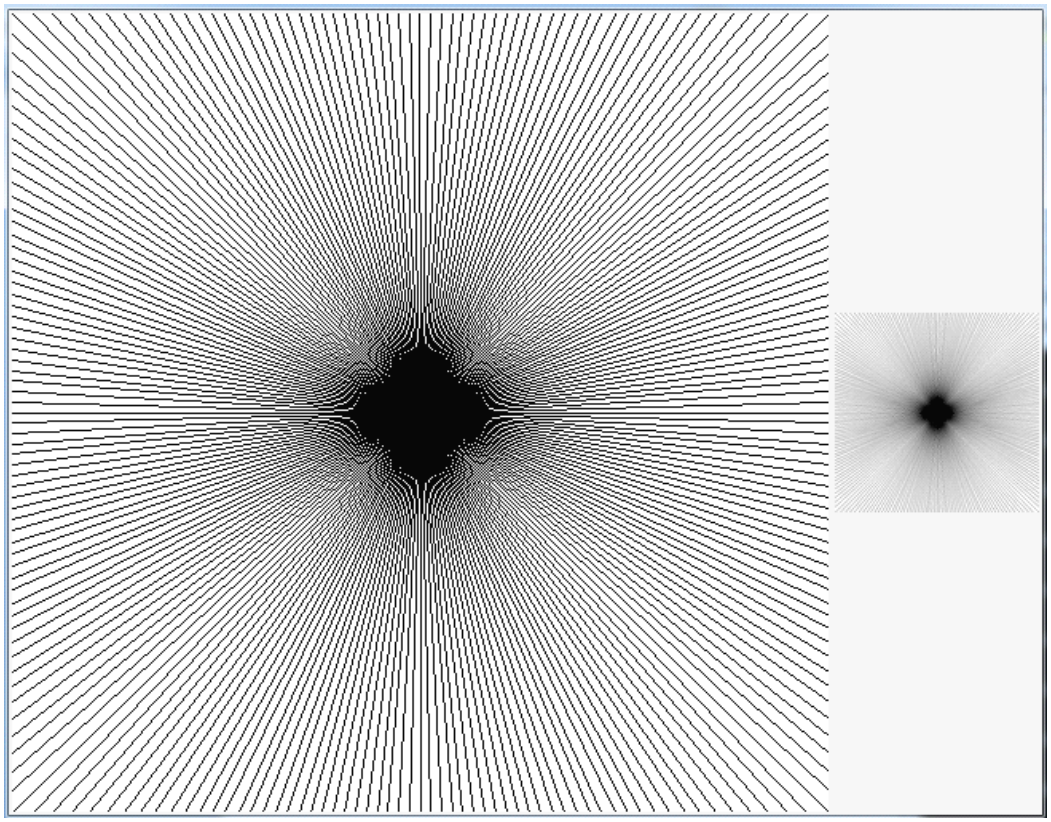
(**note: the firstone is with anti-aliasing , the second one is not**)

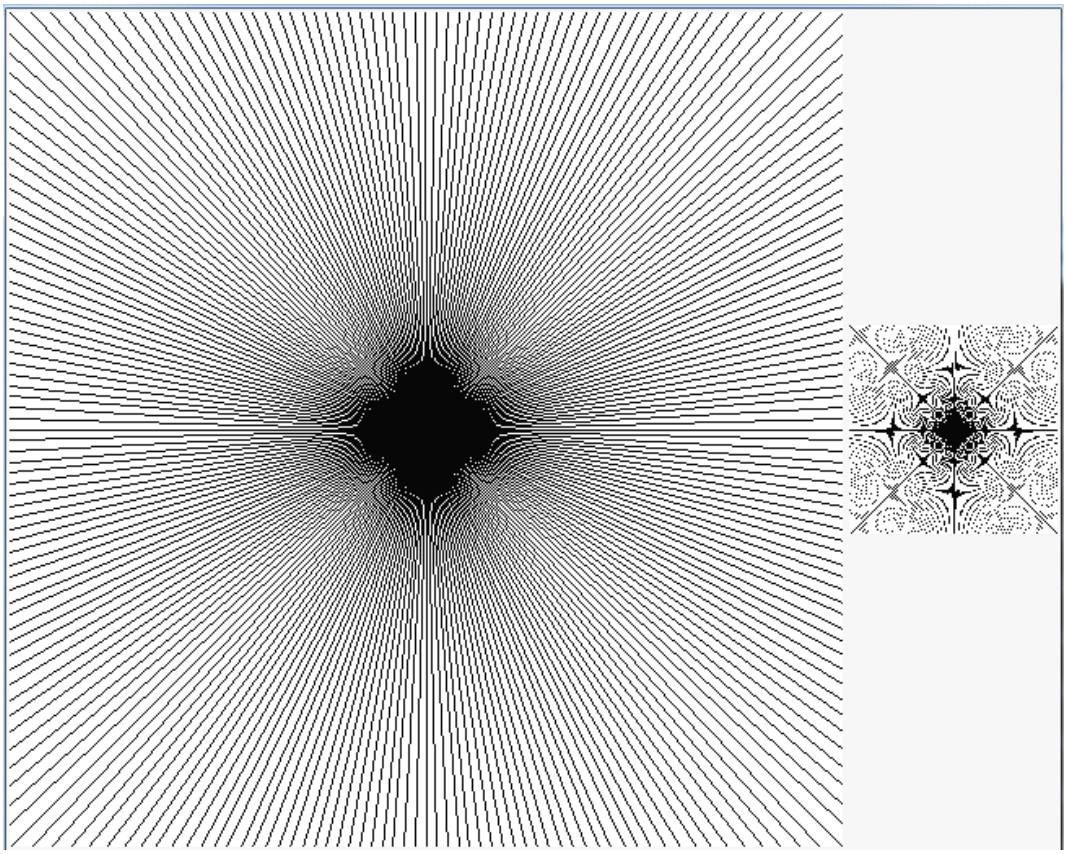




When s=4 and n=240

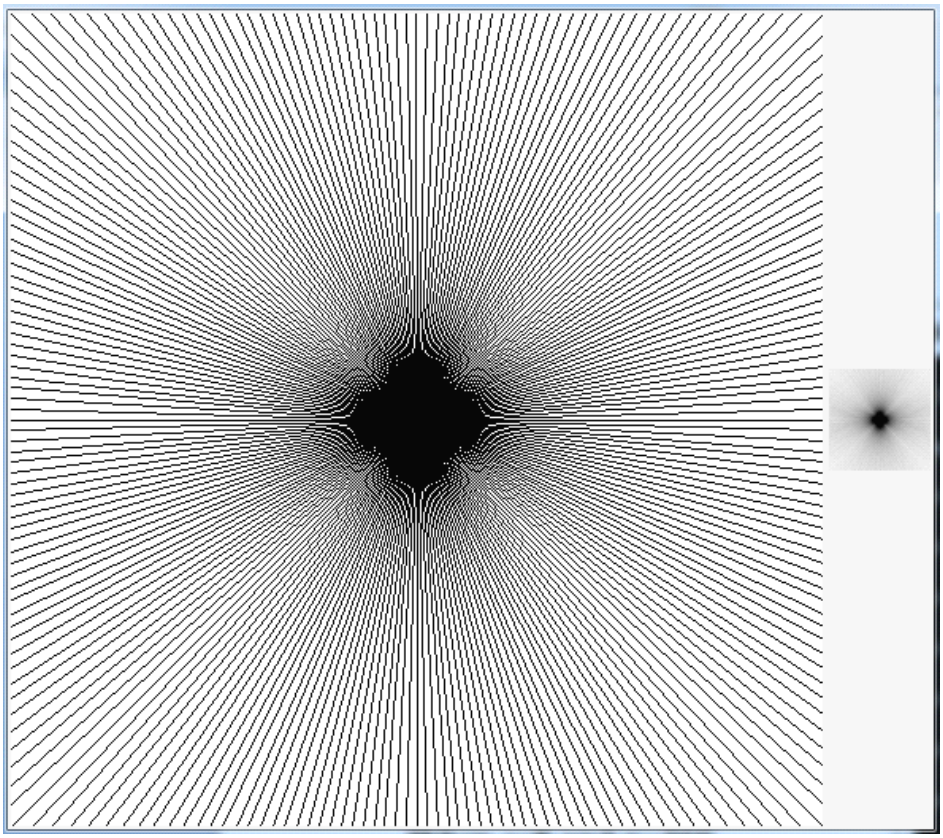
(**note: the firstone is with anti-aliasing , the second one is not**)

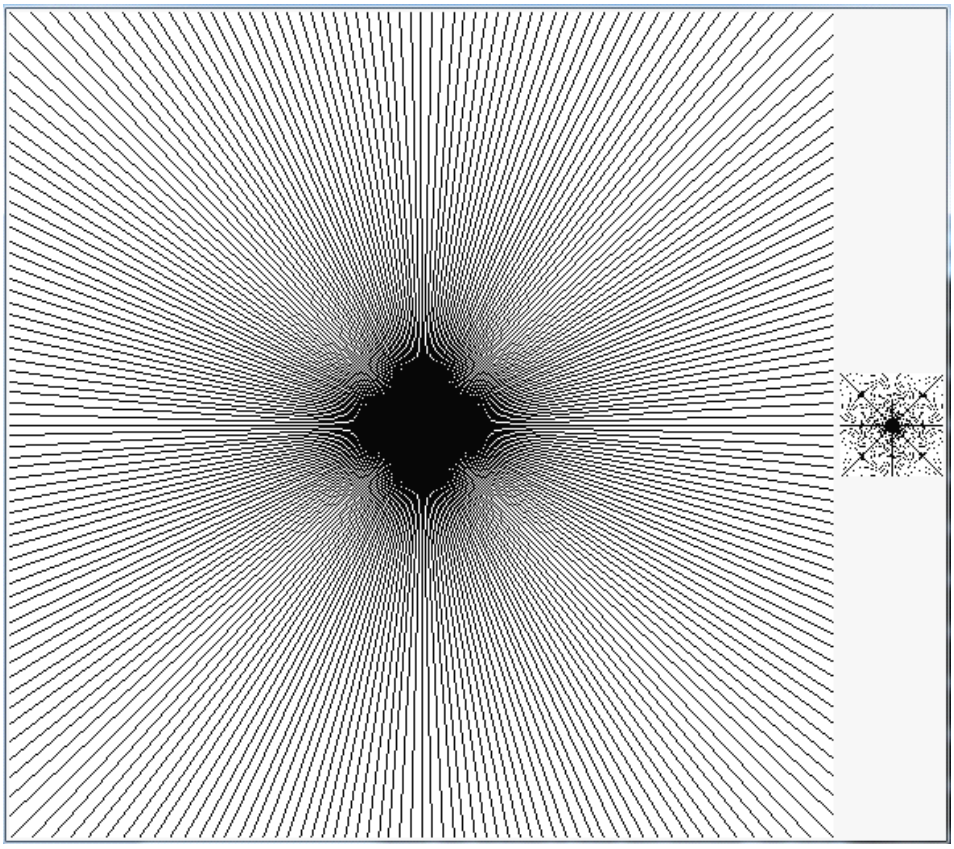




When s=8 and n=240

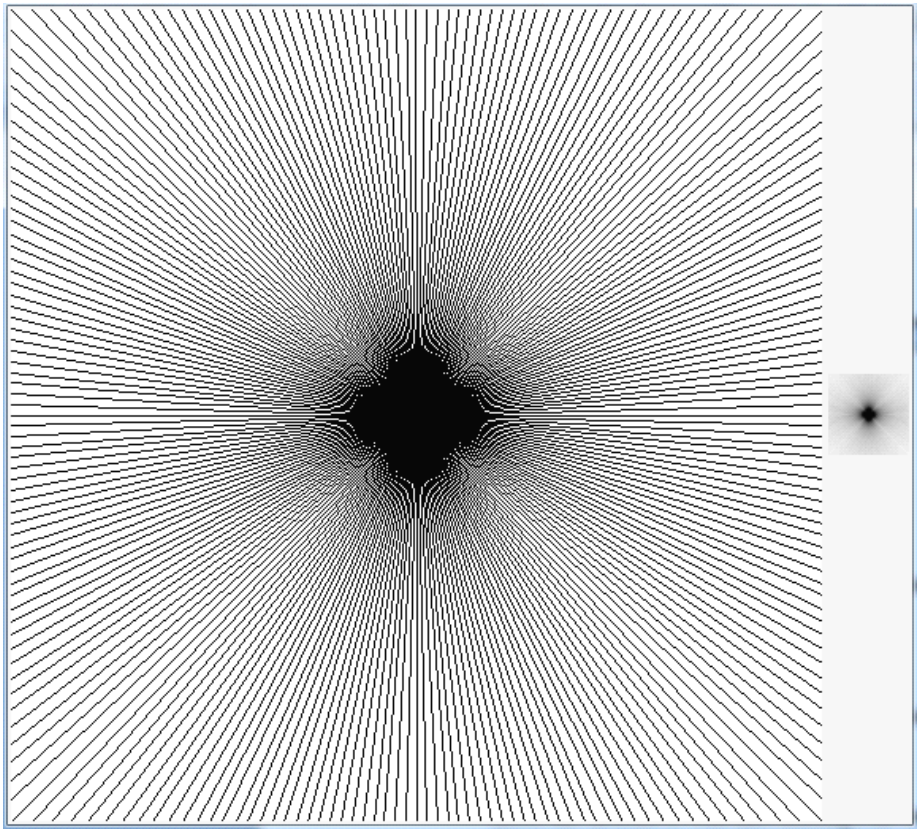
(**note: the firstone is with anti-aliasing , the second one is not**)

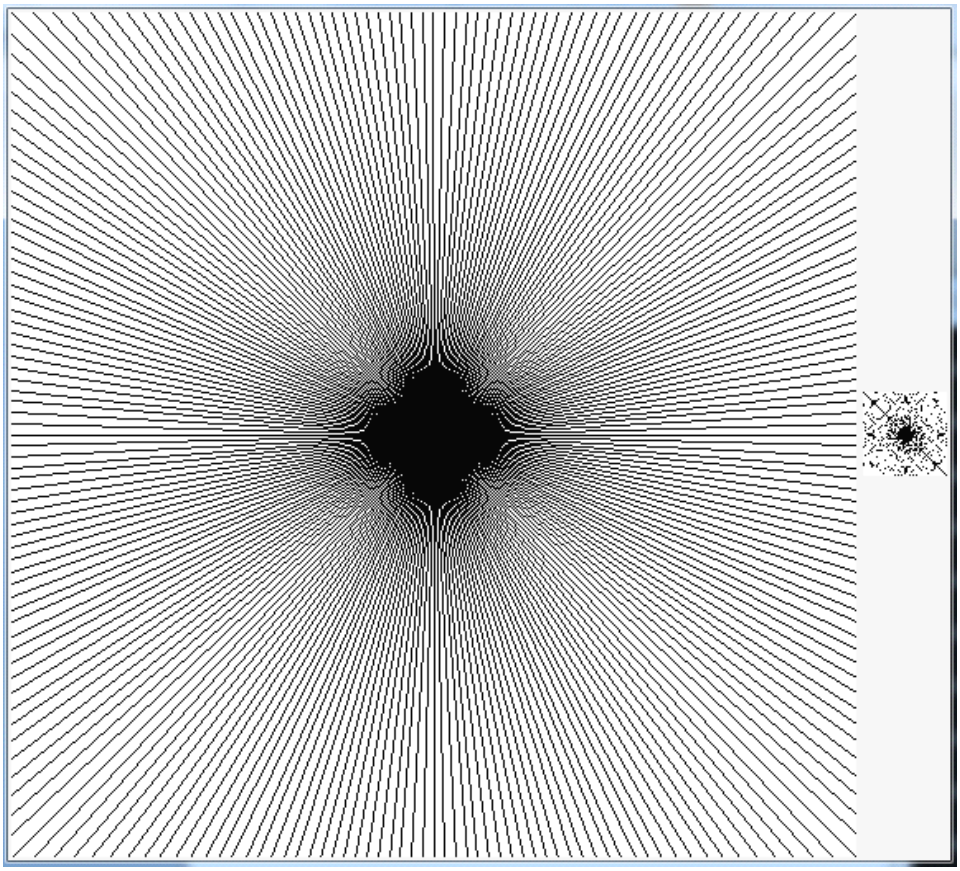




When s=10 and n=240

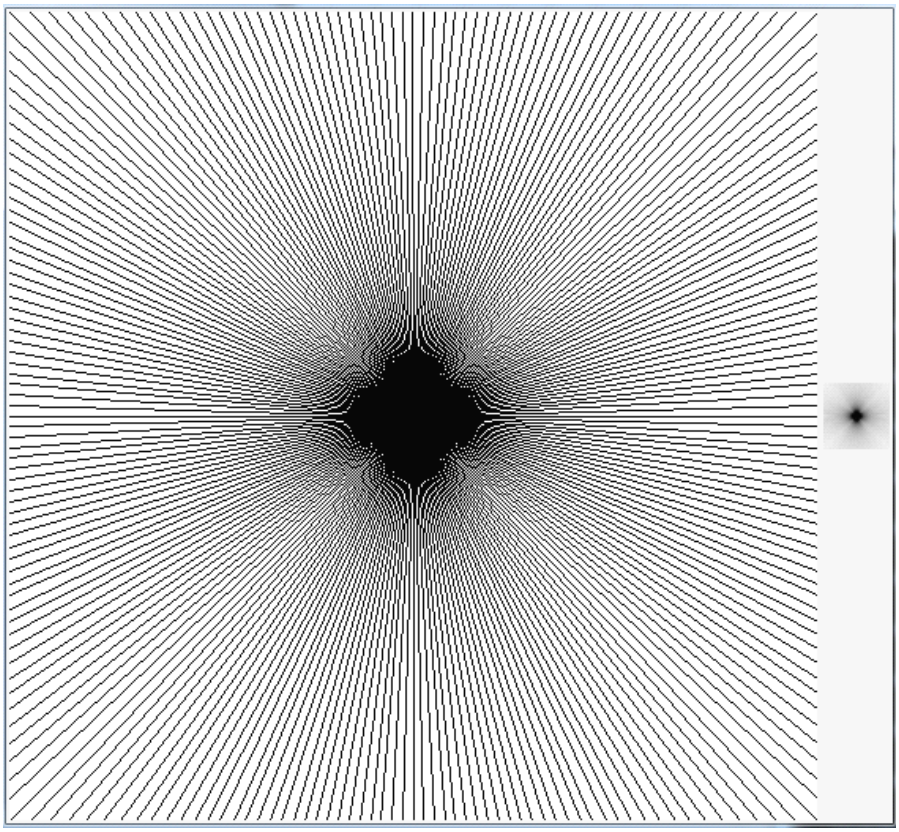
(**note: the firstone is with anti-aliasing , the second one is not**)

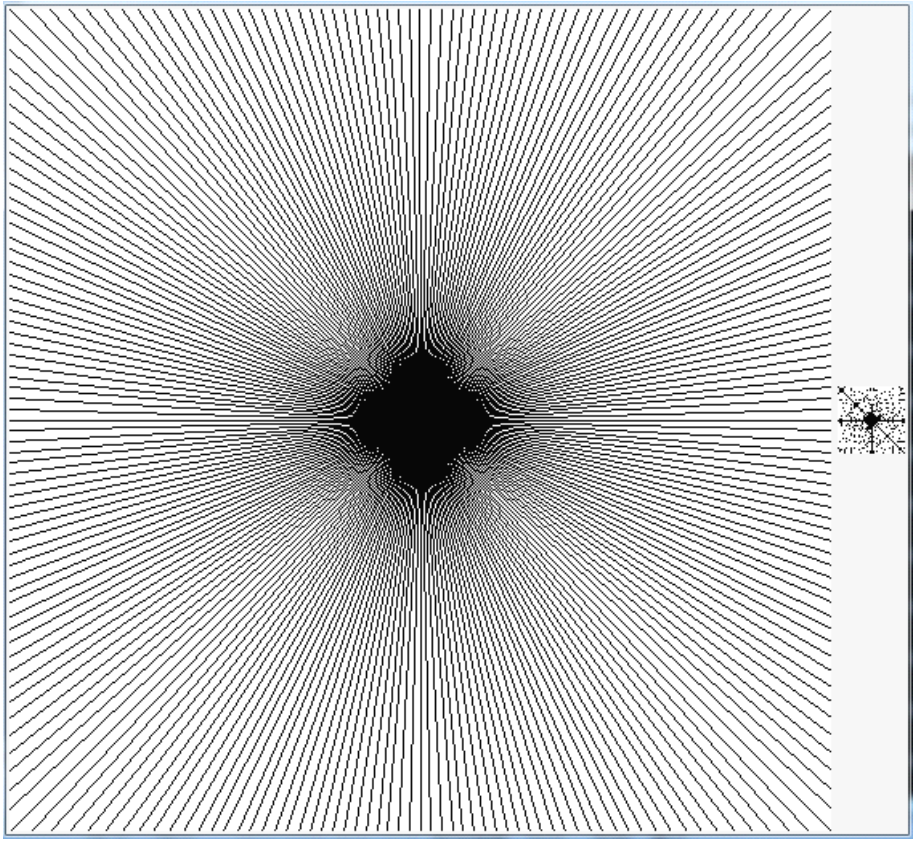




When s=12 and n=240

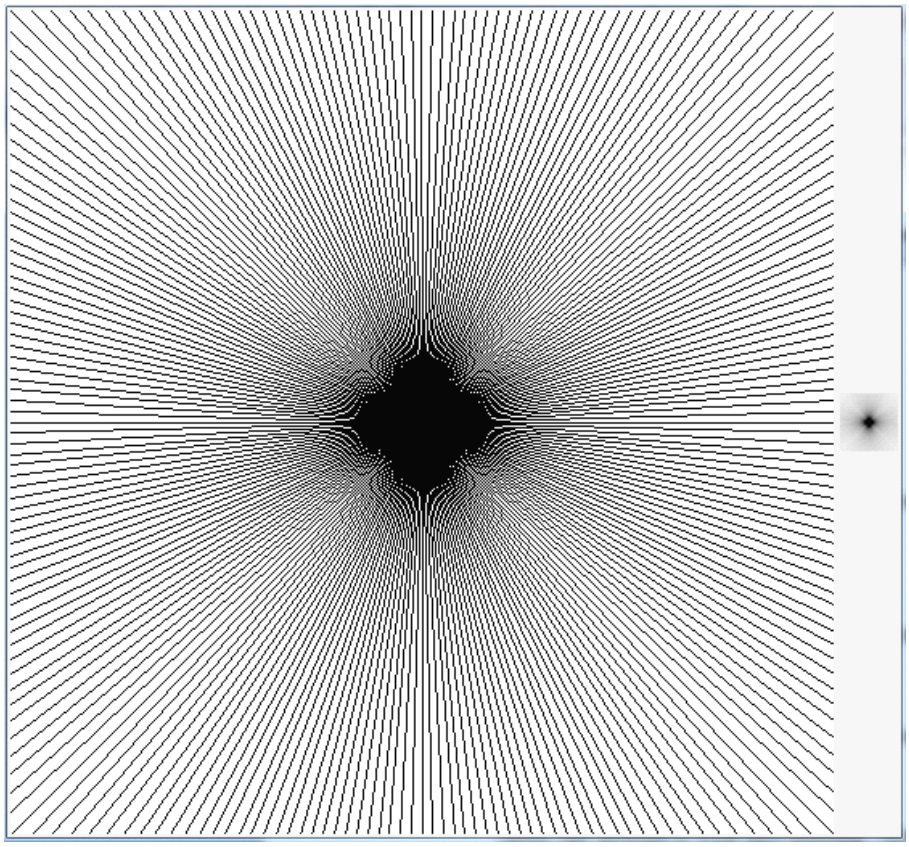
(**note: the firstone is with anti-aliasing , the second one is not**)

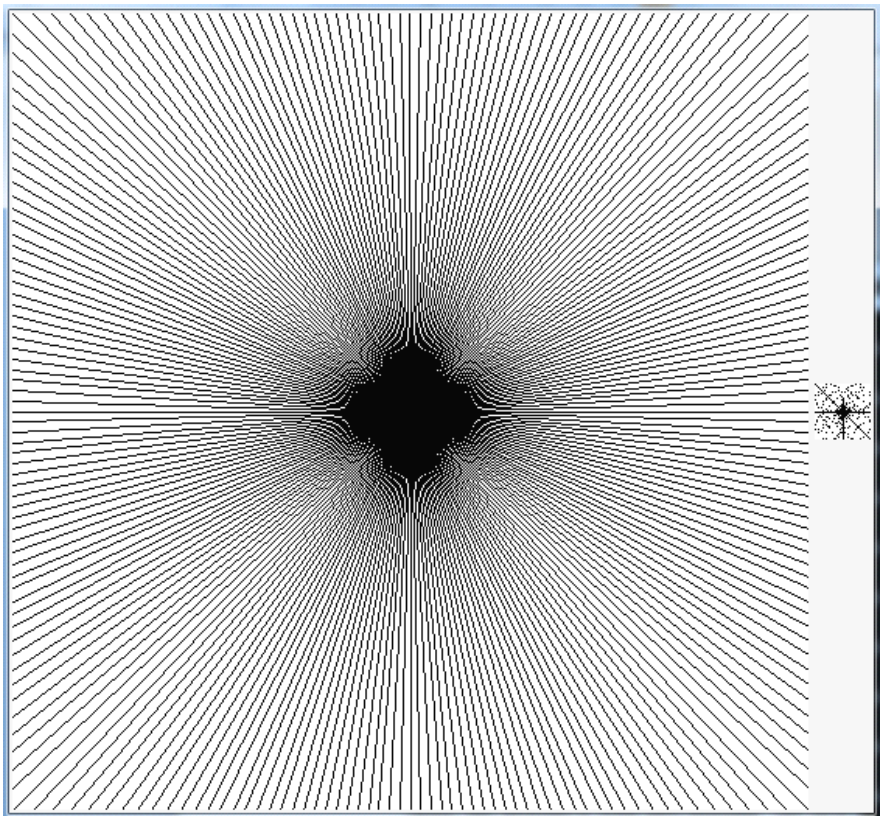




When s=14 and n=240

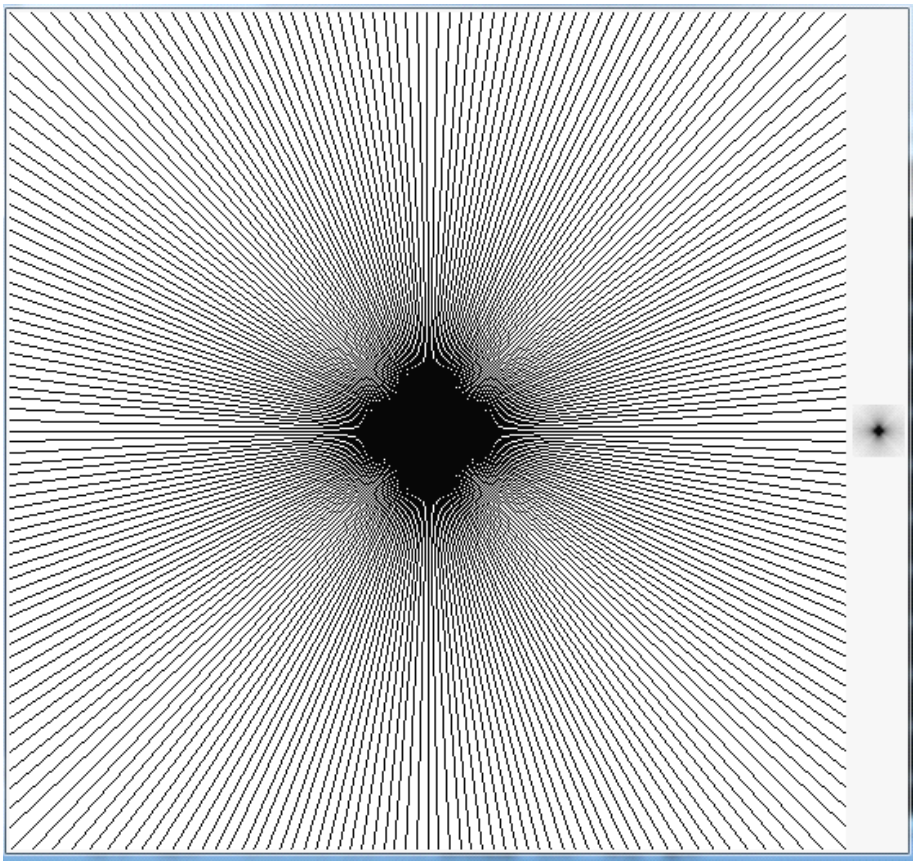
(**note: the firstone is with anti-aliasing , the second one is not**)

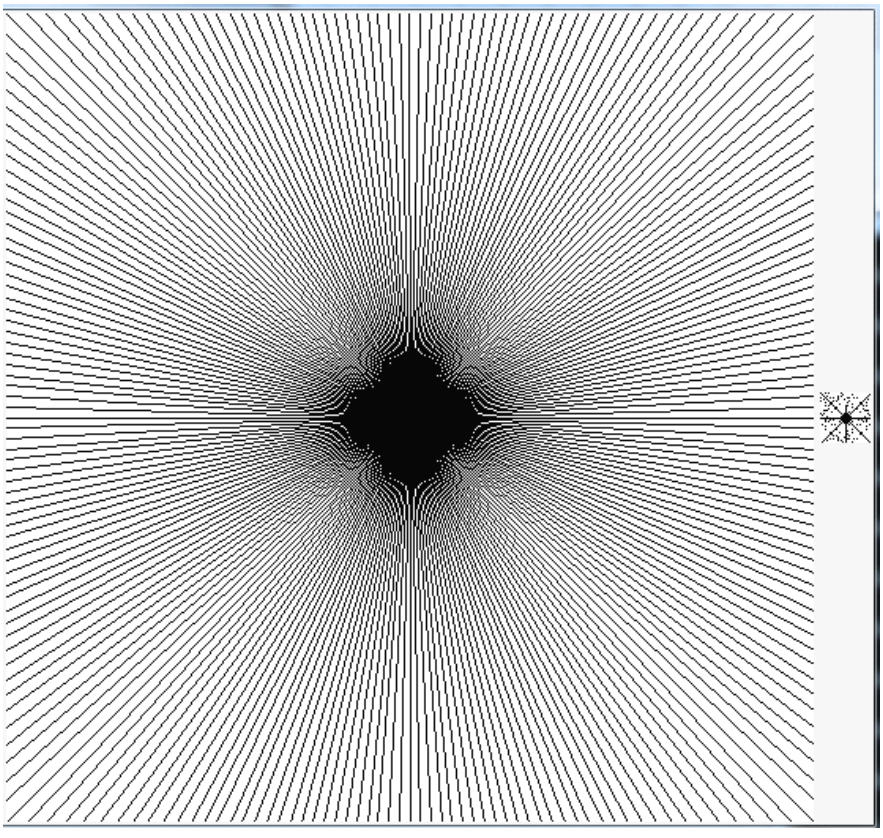




When s=16 and n=240

(**note: the firstone is with anti-aliasing , the second one is not**)





Part 2

Let's try an experiment where s (speed of rotation) remains constant and fps (number of lines) is allowed to vary. Study the value of the os (observed speed of rotation) , especially when there is temporal aliasing.

1. Can you design a formula relating s, fps and os. Evaluate if your formula works for certain values of s and fps. If s = 10 rotations per second,
2. What is the observed speed os for an fps of 25?
3. What is the observed speed os for an fps of 16?
4. What is the observed speed os for an fps of 10?
5. What is the observed speed os for an fps of 8?

My answer

As we know that since the Nyquist factor is 2*s. For those with fps >=2*s, the observed speed should still be s , on the other hand those with fps<2*s would not because of temporal aliasing .

Considering that within 1/fps time , the "wheel " would move more then half a circle, or a circle, one and a half circles, two circles....and correspondingly it costs time of 1/(2*s) 1/s 3/(2*s) 2/s.....therefore the observed speed would be different with whose fps value in different intervals

For those with s<= fps <2*s

$$os = s - fps$$

Those with 2*s/3<=fps<s

$$os = (s - fps)*3/2$$

Those with s/2 <=fps <2*s/3

$$os = (fps - s/2)*3$$

And so on.

Therefore when fps=25, os=s

When fps=16, os= -6

When fps=10 os=0

When fps=8 os=3