A1.

```
def traverse_columns(self):          0.5
    r = self.numrows()               0.5
    c = self.numcols()               0.5
    for i in range(c):               0.5
        for j in range(r):           0.5
            print(self[i,j])         0.5
```

[3]

A_2:

```
def newHead(H, x):
    while H is not None and H.data != x:
        H = H.next
    return H
```

2
1
1

A4. $c = 0 \quad x = 0$

x	$x < n^2$	c	x
0	✓	1	n
n	✓	2	$2n$
$2n$	✓	3	$3n$
⋮		⋮	
$(n-1)n$	✓	n	n^2

In the last iteration, and we will break out of the while loop.

So we iterate for these values of x:

$\underbrace{0, n, 2n, \ldots, (n-1)n}_{n \text{ values}}$.

The while runs n times.

The code is $O(n)$.

A5. a) $T(n) = 32 \log n$

Let $m = 8n$

$T(m) = 32 \log_2 8n$

$= 32 (\log_2 8 + \log_2 n)$

$= 32 (3 + \log_2 n)$

$= 96 + 32 \log_2 n$

$T(m) = T(n) + 96$

b) $T(n) = 8n^2$

Let $m = 8n$

$T(m) = 8(8n)^2$

$= 8^3 n^2$

$= 8^2 (8n^2)$

$T(m) = 64 T(n)$

A6.

	low			mid				high
	0	1	2	3	4	5	6	7	8
	2	5	6	9	11	16	18	21	34

$11 < 21$

low	mid		high
16	18	21	34

$18 < 21$

	mid	
low		high
21		34

$21 = 21$

return 7.

A7.

	0	1	2	3	4	5
	56	42	79	61	10	23
	42	56	79	61	10	23
pass 1	42	56	61	79	10	23
	42	56	61	10	79	23
	42	56	61	10	23	(79)
pass 2	42	56	10	61	23	(79)
	42	56	10	23	(61)	(79)
pass 3	42	10	56	23	(61)	(79)
	42	10	23	(56)	(61)	(79)
pass 4	10	42	23	(56)	(61)	(79)
	10	23	(42)	(56)	(61)	(79)

1 step skipped

2 steps skipped

1 step skipped

pass 5 will have 0 swaps.