A. Line 7 increments register %ebx by 52, and so we can guess that M=52/4=13. This is confirmed when we see that %ebx is used as a pointer to the successive elements in column j.
B. Line 8 checks the loop condition, and so we can surmise that %edi holds i and %ecx holds j.
C. Here is an optimized version of the C code:

```
1 void transpose_opt(Marray_t A) {
2     int i, j;
3     for (i = 0; i < M; i++) {
4           int *Arow = &A[i][0];
5           int *Acol = &A[0][i];
6           for (j = 0; j < i; j++) {
7                 int t1 = *Acol;
8                 int t2 = Arow[j];
9                 *Acol = t2;
10                Arow[j] = t1;
11                Acol += M;
12          }
13    }
14 }
```