a. 6! = 720

b.

E	F				
	E	F			
		E	F		
			E	F	
				E	F

5 ways to put E and F together * 2 because EF and FE *4! ways to put A,B,C and D and divided by 720 for the number of permutations from part a and we get

$$\frac{2 * 4! * 5}{6!} = \frac{1}{3}$$

c)

C	D				
	C	D			
		C	D		
			C	D	
				C	D

each of the above rows has 2 ways to arrange CD (CD and DC)

The first row has 3 ways to put AB

C C C	D D D	A	B A	B A	B

The second row has 2 ways to put AB

	C C	D D	A	B A	B

The third row was 2 ways to put AB

A	B	C C	D D	A	B

The fourth row is symmetric with the second row and has 2 ways
The fifth row is symmetric with the first row and has 3 ways

So calculating for each row

CD & DC	AB & BA	ways to place AB	total count for the row
2	2	3	12
2	2	2	8

2	2	2	8
2	2	2	8
2	2	3	12

so there is 48 total ways

$$\frac{48}{720} = \frac{1}{15}$$

d.

A	B	C	D		
	A	B	C	D	
		A	B	C	D
A	B		C	D	
A	B			C	D
	A	B		C	D

Row 1 has 2 ways (EF and FE)
Row 2 has 0 ways
Row 3 has 2 ways
Row 4 has 0 ways
Row 5 has 2 ways
Row 6 has 0 ways

That's out of 2 (EF and FE) * 6 rows = 12

so we have $\frac{6}{12} = \frac{1}{2}$