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MATH 2590 – Thinking Mathematically
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Kidney Transplant and Math

Exercise:

Now it is your turn to draw the graph. This exercise is a very simplified form of the graph theory demonstrated above. Its goal is to give you an idea of how they match pairs in a way that satisfies most of the patients in need of kidneys. In order to complete this exercise, you will need to refer to *the Red Blood Cell Compatibility Table* shown below in figure 4.

Red blood cell compatibility table

Recipient	Donor							
	O−	O+	A−	A+	B−	B+	AB−	AB+
O−	✓							
O+	✓	✓						
A−	✓		✓					
A+	✓	✓	✓	✓				
B−	✓				✓			
B+	✓	✓			✓	✓		
AB−	✓		✓		✓		✓	
AB+	✓	✓	✓	✓	✓	✓	✓	✓

Figure 4: Blood Type
(Source: http://en.wikipedia.org/wiki/Blood_type)

☒ First, look at the donor/recipient blood type information below

Donor-Recipient	Donor Blood Type	Recipient Blood Type
Pair I	B^+	A^+
Pair II	B^-	O^+
Pair III	A^+	B^+
Pair IV	O^+	AB^-

Note: According to the Red Blood Cell Compatibility Table above, all these pairs are incompatible.

☒ Second, draw a circular graph with 4 nodes, each node representing a pair.

- Third, look at the recipient/donor blood types and then try to match them. To make it easier, let us draw a table that shows all possible matches regardless of the recipient's blood type.

Donor Blood Type	**All** Possible Match	Possible **Recipients**
i.e. D_1: $\mathbf{B^+}$	B^+, AB^+	$\mathbf{R_3}$ (B^+)
D_2: $\mathbf{B^-}$	___, ___, ___, ___	___
D_3: $\mathbf{A^+}$	___, ___	___
D_4: $\mathbf{O^+}$	___, ___, ___, ___	___

- Finally, connect all possible matches.