University of Warsaw, PhD Open, Exam
Fixed Parameter Algorithms

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1. Either show that the following problem is FPT or show that it is W[1]-complete.

DUAL OF CLIQUE	
Input:	A graph G, an integer k
Parameter:	k
Question:	Does G have a clique of size $n-k$, where n is the number of vertices of G?

2. Either show that the following problem is FPT or show that it is W[1]-complete.

DISTANCE-4 INDEPENDENT SET	
Input:	A graph G, an integer k
Parameter:	k
Question:	Is there a set S of k vertices in G such such that the distance of any two vertices in S is at least 4?

3. Show (by whatever method) that there is an $f(k,w) \cdot n^{O(1)}$ time algorithm for DOMINATING SET, where k is the size of the dominating set we are looking for and w is the treewidth of the graph.

4. Show that the following problem has a polynomial kernel:

TRIANGLE DELETION	
Input:	A graph G, an integer k
Parameter:	k
Question:	Is there a set S of at most k vertices such that $G \setminus S$ contains no triangles?

5. Show that the following problem is FPT:

EDGE DOMINATING SET	
Input:	A graph G, an integer k
Parameter:	k
Question:	Is there a set D of at most k edges such that every edge is either in D or shares an endpoint with an edge in D?