Homework Assignment 6 I. Base case: Let d=c Then A = the identity mentix. If i=j then there is one walk, which is the trivial walk. If it, then there are none, which lines up with the identity matrix II. Let d20. Assume the 11th entry of Ad is the number of walks in G of length of from i toj. We must show the ifth entry of Adt is the number of walks in G of length d+1 from i to j.  $(A^{d+1})_{ij}$   $= (A^{d} \cdot A)_{ij}$   $= \sum_{k=1}^{d} A^{d}_{ik} \cdot A_{kj}$ In tength d+1, it takes two parts to walk from i to j: A walk from i to some vertex k and then an edge from k to j. I to k has length d via induction hypothesis. It to i only exists if there is an edge that connects them and gives an additional longth making i to i length dill which is A'ik Aki. So iterating over all k shows the ith entry of Adtl is the # or walks of length of I from i to j. 2. From the last problem, Adi = d iff the number of walks of length of from i to i is also o. So for A'is, A'is, A'is you eventually come across a walk from ite; whose length is the with term. Since its the first term, no other walks from i to j que shorter so min Ed I CAd); >03

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Ц.	BPS (G, S) [071/7 smood soils							
	for all x ∈ V							
	color [x] = white							
	distance[x] = INF Fall and side of the role							
	parent [X] = NIL							
	Color[x] = GRAY							
	distance[s]=0							
	parent [5] = NJL							
	Queue = new queue()							
	enqueue (Rueue, s)							
	While Queue length is not 0							
	V= dequeue (Queue)							
	for y=1 to V.length							
	if A[V] [y]= ) and (clor[y] = white							
	Color [y] = gray  distance = distance[v]-11							
	parent [y]-v							
	enqueu e							
	color[v]= black							
	The cost is relatively the same until the while							
	loop which executes a times and the inner for							
	loop, which executes another a times for a total							
	of Ocus,							
	201 (V.D)							
٠, ٢	Using BFs, you would have to divide vertices inte 2 subsets: "good" and "bad." A path from good-good or							
	2 subsets: "good" and "bad." A path from good-good or							
	bad-bud is always even and every other (gse is odd)							
	since edges can only connect vertices of the apposite							
	type. So you would use BFS and check the distances							
	of the vertices from its Aeighbers. If any are even,							
	then you can assign them. If they are an odd, then you can assign togood guys. The algorithm is							
14	95 follows:							

	Pick source EVEG] (20)290	, N						
	BFS(6,5) V → x 11 x xôt							
	for all $\times f \times [b]$ The solution of the solut							
	for all y f distance [6]							
	if distance [x] = distance [y] y. 2	ì	•					
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	Assign good guys							
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	(9,W) forward							
	(a,t) tree							
	(s,v) tree							
	CW,S) back the land the land of the land o							
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	(x, z) tree back							
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	(t,y) tree (y,q) back							
	cr, n) free							
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