An Introduction to …?

As Prepared by the 2012 ISU REU

BrainStretcher#1:

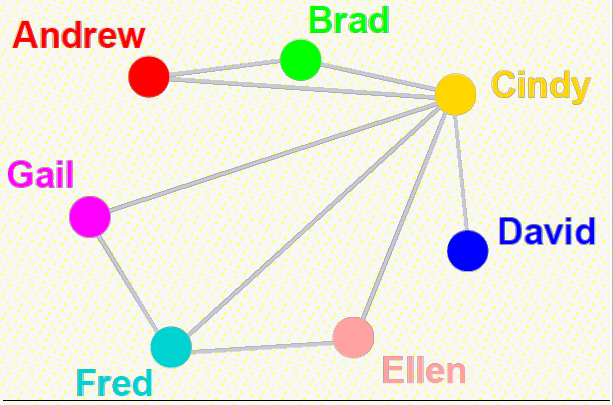
Thereare7kidsattendingtheRedBirdswimcampthissummer.The campcounselorshavenoticedsomekidsarefriendswithsomeorall oftheotherkidsandarewonderingiftheycanmakeavisual'cheat sheet'sotheyknowwhoisfriendswithwho.Canyouhelpthemout? Hereistheinformationfromthecounselors:

Andrew:	Brad,Cindy
Brad:	Andrew,Cindy
Cindy:	Andrew,Brad,David,Ellen,Fred,Gail
David:	Cindy
Ellen:	Cindy,Fred
Fred:	Cindy,Ellen,Gail
Gail:	Cindy,Fred

BrainStretcher#1PossibleAnswers:

Let'sseewhatyou'vemade!

BrainStretcher#1SampleAnswer:



WhatwelearnfromBrainStretcher#1:

Graph

FriendshipGraph

Vertex

Edge

HowtowriteaGraphRelationship:

BrainStretcher#1Extension:

Drawonyourown:G={{1,2,3,4},{{1,3},{4,1},{2,3},{3,4}})

WhatwelearnfromBrainStretcher#1'sextension:

Isomorphicgraphs

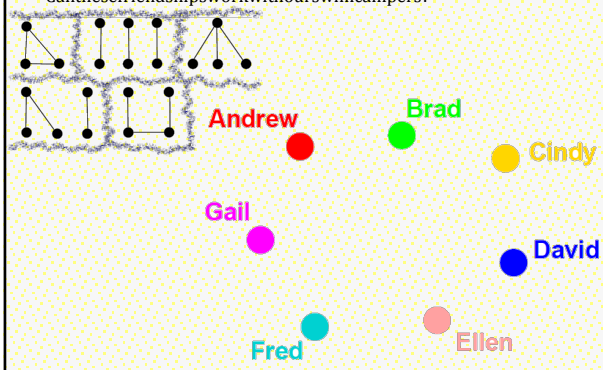
Labelingvertices

BrainStretcher#12ndExtension:

Howmanygraphscanyoumakewiththreefriendships?Remember eachfriendshipisanedge!

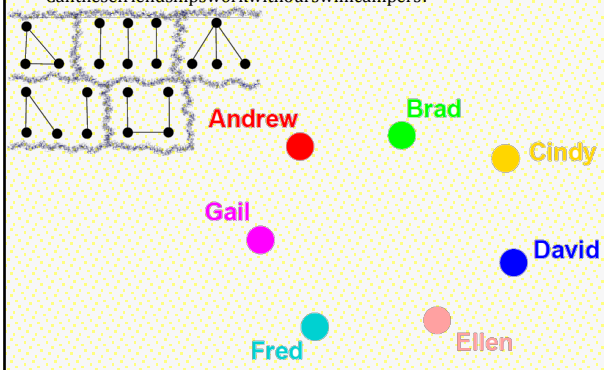
BrainStretcher#12ndExtension:

Canthesefriendshipsworkwithourswimcampers?



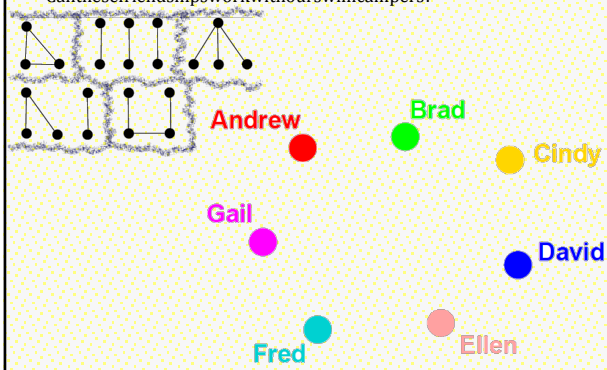
BrainStretcher#12ndExtension:

Canthesefriendshipsworkwithourswimcampers?



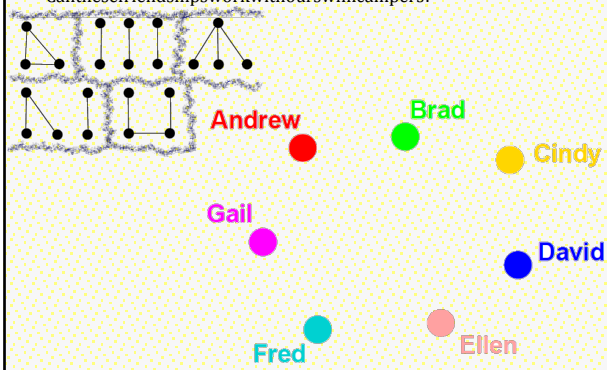
BrainStretcher#12ndExtension:

Canthesefriendshipsworkwithourswimcampers?



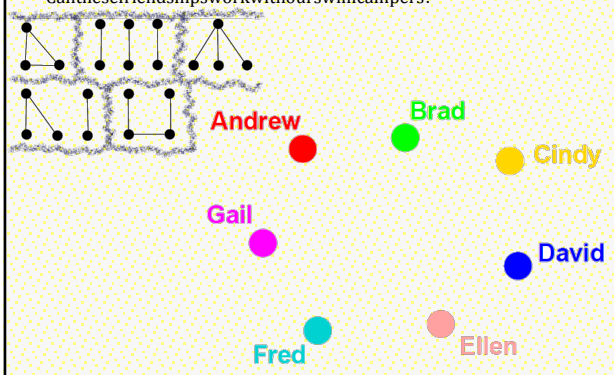
BrainStretcher#12ndExtension:

Canthesefriendshipsworkwithourswimcampers?



BrainStretcher#12ndExtension:

Canthesefriendshipsworkwithourswimcampers?



WhatwelearnfromBrainStretcher#1's2ndextension:

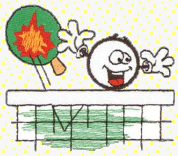
EdgeLength

Embeding

BrainStretcher#2:

The counselorsatRedBirdswimcampwanttohaveaweekend activitysomoreofthekidsinteractwitheachother.Theydecideto holdaping-pongtournamentandwanttobuildaschedule.Theonly problemisthatDavidishomesickwiththelusoonlyAndrew,Brad, Cindy,Ellen,FredandGailcanparticipate.Canyouhelpthe counselorscreateaone-on-onetournamentschedule?Let'sstart togetherwithround1.

Round1:



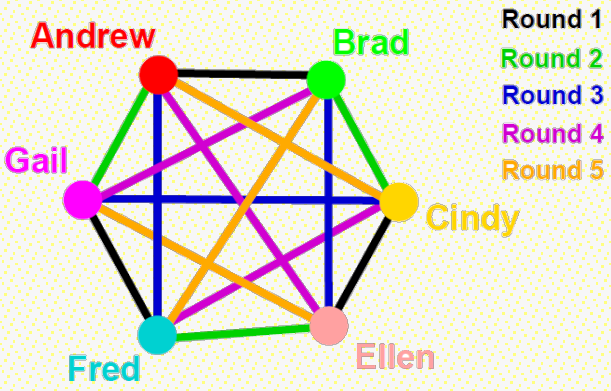
BrainStretcher2PossibleAnswer:

Let'sseewhatyou'vecomeupwithforapossibleschedule

Round1: Round2: Round3:

Round4: Round5:

BrainStretcher2GraphRepresentation:



WhatwelearnfromBrainStretcher#2:

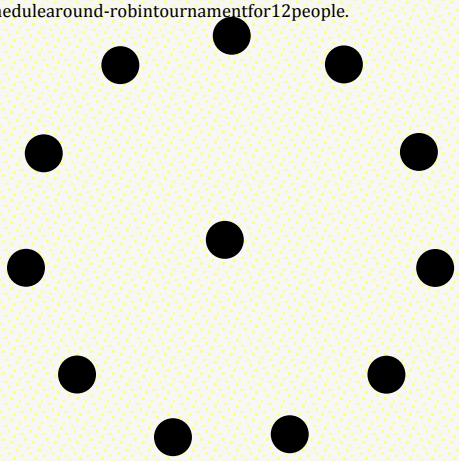
CompleteGraph

ProperColoring

Decomposition

BrainStretcher#2Extension:

Schedulearound-robintournamentfor12people.



WhatwelearnfromBrainStretcher#2'sextension:

StarterGraph

Clicking

BrainStretcher#3:

ThecounselorsatRedBirdswimcampsawhowsuccessfultheping-pongtournamentwasatgettingthekidstomakemorefriends,sonow almosteveryoneisfriendswitheveryoneelse.SinceDavidwasout sickwiththeluftheping-pongtournamenthewasunableto participatesothecounselorswanttocreateatournamentofhis choosing.Davidchoosestohavethelastweekendofcampbea3-playervideogametournamentofMarioKartWii (c).Canyoucomeup withascheduleforthistournamentsuchthateachpairofcampers playtogetheratleastonceknowingyouonlyhave1Wiisystem?Let's doRound1together.

Round1:

BrainStretcher3PossibleAnswer:

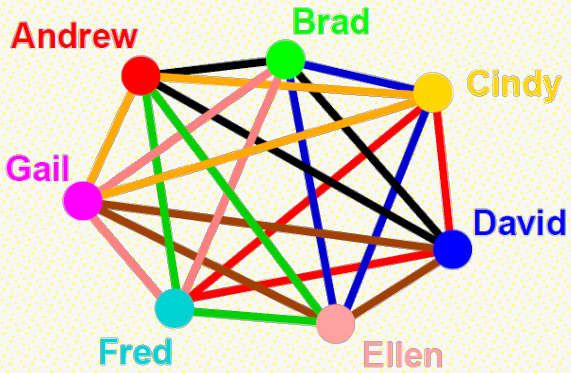
Let'sseewhatyou'vecomeupwithforapossibleschedule

Round1: Round2: Round3:

Round4: Round5: Round6:

Round7:

BrainStretcher3GraphRepresentation:



WhatwelearnfromBrainStretcher3:

Decomposition

Clicking

EdgeLength

BrainStretcher#4:

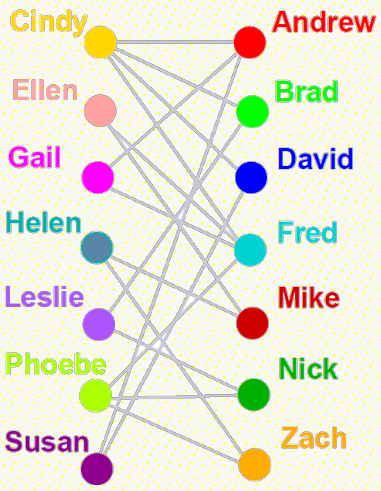
AlloftheRedBirdcampsarecomingtoanendandtheswimcampers arejoiningalltheothercampersforaSadieHawkinsEndofCamp Dance.Theswimcampershavedecidedtojoinupwiththekidsatthe horsecamp.Luckilythereareanequalnumberofgirlsasboysand thegirlswanttomakesurethattheyeachaskoneoftheboysandno oneasksthesameboy.Todothisthegirlsneedtoigureoutwho knowswhoandigureoutwhoaskswho.Tostarteachgirlhaslisted whichboystheywouldliketotake.Canyouhelpvisuallyorganizethis informationtohelpthegirlsigurethingsout?

Cindy:	Andrew,Brad,David,Fred
Ellen:	Fred,Mike
Gail:	Andrew,Fred
Helen:	Mike,Zach
Leslie:	Brad,Nick
Phoebe:	Fred,Nick,Zach
Susan:	Andrew,David

BrainStretcher#4PossibleAnswers:

Let'sseewhatyou'vemade!

BrainStretcher#4PossibleRepresentation:



WhatwelearnfromBrainStretcher#4:

BipartiteGraph

ProperColoring

Problemsforyoutotry!

1)Makeasmanygraphsaspossibleshowingfourfriendships. (Remember,thatmeans4edges!)

2)Makeasmanygraphsasyoucanbetweenfourpeople showingwhatpossiblefriendshipscanexist.(Remember,that means4vertices!)