Major Malfunction

A Mini-Hunt by Dan Katz

So this past September, I finally left MIT and began a Ph.D. program in Mathematics at Brown University. To which a lot of people say, "Hey, that's that school where they don't have formal grading, and you get to choose your own curriculum, and all that! Cool!" Well, that may (or may not) apply to the undergraduates, but I can tell you that as a grad student, my academic experience is a lot more structured. The work is hard, the curriculum is rigid, and the campus social scene is based pretty heavily around the undergrads. But all in all, I'd have to say that the worst thing about Brown is…

Well, for you to truly understand how I feel, you'd have to see a best-case scenario first. So in order to express how things could have been, I've devised a series of puzzles representing my ideal curriculum at Brown*. Enclosed, you will find material from twelve courses, as well as your final exam. The twelve courses can be sorted into four groups of three, and solving each group of three will yield a word. (You'll have to solve the puzzles to figure out which trios go together.) Those four final words are necessary (though not necessarily sufficient) to complete your exam and reveal my least favorite thing about Brown.

If you need any help, I've extended my office hours for your convenience. If you need any clarifications or think something might be wrong, let me know, and I'll do what I can. I'll warn you in advance, though, that I will not confirm answers to individual puzzles. I will confirm any of the four final words which are derived from sets of three puzzles, and of course I'll confirm the ultimate uber-answer (my least favorite thing about Brown, in case you forgot since the last two paragraphs.)

Best of luck to you, and hopefully afterwards you'll appreciate semester break as much as I do.

Sincerely,
Dan

*ideal curriculum compromised here and there for the sake of making the puzzles work

NOTE: This mini-hunt was designed as a warmup for Setec Astronomy before the 2004 MIT Mystery Hunt, although after the Hunt I'll be releasing it to the public. (Special thanks goes out to Lance Nathan for test solving and PDF-ifying for me.)

As Internet searches are a big part of solving the Mystery Hunt, several of these puzzles are intended to be solved by doing research. Solving without a computer may be possible (especially for heavy pop culture aficionados), but it's not recommended.

Confirmation of answers, requests for clarifications and/or hints, and general feedback can be directed to Dan Katz (also known as Spelvin in the NPL) at <thedan@brown.edu>. I'll try to get back to people as soon as I can, but keep in mind that I'm a bit busy with the whole math thing.

Logic (Course #1226)

So wait, I have to use logical reasoning to figure out which elements of logical reasoning can be derived by logical reasoning? What?!?!

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

I'm thinking of three different capital letters of the alphabet (as shown above.)
Exactly two of the letters have a horizontal axis of symmetry.
Exactly two of the letters include curved line segments.
Exactly two of the letters include at least one closed loop (which may be composed of straight segments and/or curved segments.)
Exactly two of the letters are consonants.
Exactly two of the letters occur in the phrase "BROWN UNIVERSITY."
In reverse alphabetical order, the letters spell a common English word which is not a verb.
In alphabetical order, the letters are the answer to this puzzle.

Home Economics (Course #1841)

I burnt dinner again. Let's just order Chinese. One from each column, right?

```
CAB  ADI  ACK  DAS  ACR  ANN  MOV  ANK

CAN  ELN  ANA  DRA  EFO  FIR  MRA  BET

JAC  GIN  CTE  HTE  EMS  GAT  PHA  DAR

LET  HUN  DRE  NAM  ENI  IOU  RER  DMA

ONE  KBL  EIG  NEL  FOR  NAL  SBL  IES

RAN  LEC  GIN  NTH  NAC  ONY  STW  ORD

RES  TER  HAN  STE  ROM  RDR  UGM  RAL

VOW  TRI  ICK  THE  TIN  SNL  UME  UNS
```

1) 10 6 2 6
2) 5 8 3 4 4
3) 3 7 2 5 7
4) 8 6'1 5 4
5) 7 2 3 7 5
6) 4 5'1 9 5
7) 5 7 3 3 6
8) 6 8 2 8

Geometry   **(Course #2471)**

I remember when I used to have the area of a hexagon memorized. How useless.

Find the words and phrases hinted below by moving from hexagon to hexagon. Use each hexagon exactly once, except for the central hexagon, which is not used.
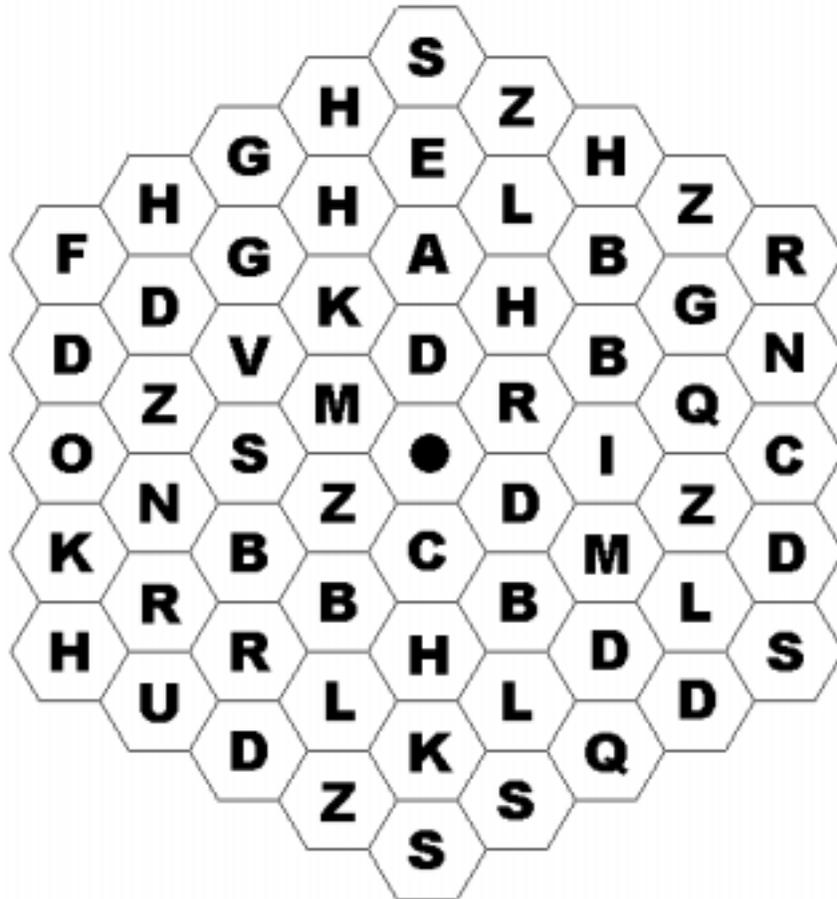
* a sci-fi series
* a number system
* a type of verse
* an implement of destruction
* a breakfast food
* a group of heroes
* a series of tones

**Foreign Languages**   **(Course #3071)**

I don't know how I'm supposed to do this without a translation key.

14 3 20 21 1 18 3 17 2 6 27 26 9 6 25 23 4 4 12 18 5 19

Geography (Course #3820)

It's just a matter of knowing where everything goes.

The answers to these cryptic clues are to be entered in the grid unaltered, although enumerations are withheld. Six answers are capitalized.
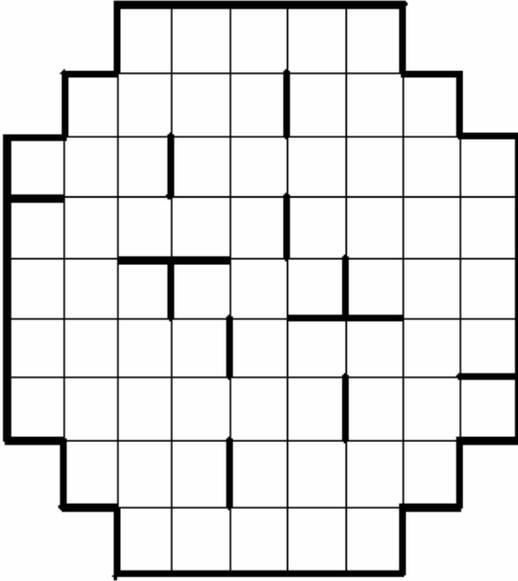
Texas landmark in the style of Missouri
Pacino films first alien sitcom
Esoteric ace ran awkwardly
Bodegas earned, stores lost
X100 is stylish
Layer of paint covers south shore
Sear off sensory organs
Space pistol ("Auto Sci") ends race in the future
Involve teal in new configuration
"Lethal Lard And Gore"
Breaking a male passenger's leg
Curse him! (Subjectively, it marks the spot)
Ancient South American in fire
Mother quietly sketches initial charts
Makes out computer makers next to Kappa Sig!
No one restricted Black in Paris
Offspring sent back rejections
Break up endless social gathering
Removing skin and innards of swamp eel in glade
Irani money left where animal lives
A king wears derisive smile and athletic footwear
Police man works in downpour, working very hard
Sailor turned betrayer
Deducted weight from ecstasy after previous answer
Croatian-born scientist reinvented slate
Mr. Turner leaves, relaxed, from Eurasian river
The old piano is okay for a cowboy?

Creative Writing   **(Course #4266)**

Writing is like doing improv… You tell a story, and when you come to a turning point, you get a suggestion from the audience. Well, no, I guess that's actually why Mad Libs are like improv.

      The alarm went off far too early. I rolled over and dragged myself out from beneath the cottony cushions of my bed. It had been a long and lonely night… I'd stayed up late watching the DVD extras for ___(movie)___, and then an airing of Evolution on Cinemax. I'd left the TV on, and Absolutely Fabulous was on, which I despise more than any other program I can think of… so I popped in an old tape of ___(show)___ and went about my morning routine. I made a mental note to tape the rebroadcast of Mike Nichols' Angels In America while I was out.

      Checking my Hotmail account, I noticed a letter from my best buddy ___(stage name)___ , who was taking a break from playing bass and vacationing in Kathmandu. But I figured I'd check it later, as I had a lot of work ahead of me. (If only I were still in Canada… it was Thanksgiving there today, and I wanted the day off pretty desperately.) And I was out of coffee, so I was stuck drinking that lemonade named after the actor. Things were not looking up so far.

      Showering was a bit of an adventure; I'd had a nightmare last night that I was an alien in the shower, and I'd gotten killed by the ___(substance)___ in the shampoo; but in reality I was ___(stage name)___, I was human, and so I was safe. And of course I had great hair, which cheered me up a bit. Heck, I was willing to bet I was currently sporting the best hair in all of ___(state)___, and that cheered me up a lot.

      My mom always used to say you can never leave the house too prepared, so after getting dressed, I grabbed the first thing in my closet that I saw, which turned out to be a goofy-looking ceramic oval thing with eight holes in it; who knows where I picked that up. I also needed something to listen to in my CD player en route, and I couldn't decide between REM and Peter Gabriel, so I grabbed albums by both (hey, they had the same name.) I almost grabbed the Orson Scott Card novel I'm reading (the one he won a Hugo for in 1986), but I figured I'd have very little time to read today. Suited up and looking good, I set off, just barely remembering to set the VCR to ___(channel)___ before I left.

      I walked for about ten minutes before I ran into a chimera. Or a sphinx or something, I don't know the difference, but whatever it was, it was scary. Instinct immediately kicked in, and I remembered that music hath charms to soothe the savage beast. So, realizing I had an ___(instrument)___ in my backpack, I tried playing the most soothing song I could think of (the fourth track from The Wall), but I quickly realized I didn't know how to play the thing. I pulled out my CD player as Plan B and tried playing my copy of ___(album)___ at full volume, but the creature couldn't hear it through my headphones. I was as doomed as Charo's career.

      Then suddenly my dog, whom I'd never been particularly fond of (since my girlfriend had named him after the daughter on my least favorite TV show) bounded in out of nowhere. With a ferocity I hadn't seen since, well, last night (in the Deathstrike fight scene deconstruction), ___(name)___ leapt toward the beast, and it ran away screaming. I felt a surge of victory, like that time in Boston that I won the WWE tag belts with Hulk Hogan. It was electrifying.

      Deciding to skip work after all, I walked my faithful puppy home, telling him about my day (and rehashing the Diz speed-story I'd watched this morning when I ran out of material.) I spent the remainder of the day listening to Fountains of Wayne, reading ___(novel)___, and wishing my best friend would come back from ___(country)___. (Later I watched The Wild Thornberrys so I could hear his voice.) I guess most of the day was pretty uneventful. But the morning… Oh yes, I'll always remember that triumphant ___(month)___ morning in Murfreesboro, when on very little sleep, I did a whole bunch of contrived stuff exclusively for the purpose of making this puzzle work.

Algebra   **(Course #4601)**

Let's see… localize the ring and the maximal ideal must be finitely generated since the local ring is Noetherian, and since we're in a PID, we can conclude that all the best puzzle ideas come from old Games Magazine contests.

$$X = \frac{a^{bcd} e (f - g)}{(hi)^{j}(kl)^{m}}$$

a = Middle initial of the mascot "created" by Norman Mingo
b = Number of letters in the title of my favorite (full-length) Jesus Lizard album
c = Uneventful song performed by Harold Dobbs' band in the play Proof
d = Film in which electronic musician Clint Mansell plays a photographer
e = Number of actors who played Pete Wrigley on Nickelodeon
f = Smallest nonnegative cube which is not also a square
g = Film in which Bob Mack plays "Gluttony Victim"
h = WCW wrestling pay-per-view broadcast in January 2001
i = Number of minutes it takes Paul Strathern to explain a philosopher
j = Number of letters in the title of my favorite (full-length) Jesus Jones album
k = Fictional product which is great for a snack and fits on your back
l = Total number of episodes in the first five seasons of Buffy The Vampire Slayer
m = Number of wives of Henry VIII whom he neither divorced nor beheaded

Psychology   **(Course #4985)**

Our subject has attempted to reinforce his ego and exaggerate his own importance by assuming a nickname. Such behavior is common, but there is always the risk that the subject, in doing so, will sacrifice part of himself.

Live performance venue
Like most Sunday crosswords
Laius or Jocasta, e.g.
Curative treatment
The property of those people
Cliff Huxtable's son, et al
Speculations
At that place
From that place
Believer in God
Crime in a museum, perhaps
First name in silent film
Unit of heat

Flexible logic gates
Modern form of evidence
Beowulf beverage
Sierra _____
Provide food for
Hedonistic parties
Speedy sleep activity
Grating, as a voice
"_____ upon a…"
Pretentious assumed manner
Frequently
Coffee source
Before poetry?

Set Theory   **(Course #6054)**

Set theory proofs are generally very straightforward... one begins with a set, messes around with its properties, and achieves the desired result. The only real trick, of course, is to use the right words.

1. Change a number to E.
2. Change both instances of a repeated trigram to OL.
3. Change a chemical element to the alphabetically antepenultimate Avenue in Monopoly.
4. Change a color to a member of the family Ulmaceae.
5. Reverse the order of a run of three consecutive letters of the alphabet.
6. Delete a number.
7. Place the postal abbreviation for Illinois between two other state postal abbreviations.
8. Replace a number with a number greater by one.
9. Replace a Keanu Reeves character with a three-letter past tense verb which is an anagram of its present-tense form.
10. Replace two words which precede "man" in a common three-word phrase with a word following "Eight Minute" in the title of a popular exercise video.
11. Replace a room with the masculine indefinite article in Spanish.
12. The result is the solution to this puzzle.

Acting   **(Course #6276)**

I hate to be pessimistic, but this is the worst script I've ever read. I don't know how I'm supposed to make a name for myself doing material that doesn't make any sense.

```
JOHN: Like it could disguise itself as anything... a pack of cigarettes?

MIKE: You! You're the elevator killer!

JOHN: I'm not a murderer. I've never even met the man I'm supposed to
kill.

MIKE: Let's slip away under cover of afternoon in the biggest car in
the country.

JOHN: Fine, you wanna clock me? You think you can take me? Come on!

MIKE: I have more serious things on my mind than girls and school.
Things I'm dealing with.

DOUG: I'm a genie in a suit. Just rub me and make a wish.

JOHN: I take the newer medications, but I still see things that are not
here.

MIKE: Can't you shut up? I'm busy. Boy, what a great show.

JOHN: They are only monkeyboys... we can still crush them here on Earth.

MIKE: Is that, uh... your profession or... your pleasure?

JOHN: You know the best thing about pain? It lets you know you're not
dead yet!

DOUG: Is your name Tattoo? Because I swear to God, you're living on
Fantasy Island.
```

Music   **(Course #7430)**

Radio is a cruel format…too much interference, too much competition. If you don't grab the listener at the beginning of your song, they probably won't stick around for the end.

CHOAMAPASGISNE
SCLEOMISSONINGIC
DINEVIXLS
HODLOLEL
FAFISTBRALLE
BEMDADTONINAME
RATINCIMED
RAPADRIANOHEOAIDD
SOPURNEDGATRTDEYN
ILDLEITTWILLED

Computer Science   **(Course #7948)**

I never really got the hang of coding… the lab assistants always said my code was too inefficient. I have a bad habit of leaving in extra bits that aren't necessary.

D	B	C	C	A	E	I	E	A	A	D	C	A	F	A
E	C	H	I	A	E	L	L	A	I	E	G	E	G	A
E	E	N	O	D	E	X	N	G	I	G	I	F	M	A
R	E	T	R	D	G		P	H	N	I	S	T	R	E
T	N	Y	T	E	K		T	R	R	I	U		T	E
	X			N	S		T	T	R	N	X			H
							T	T		R				
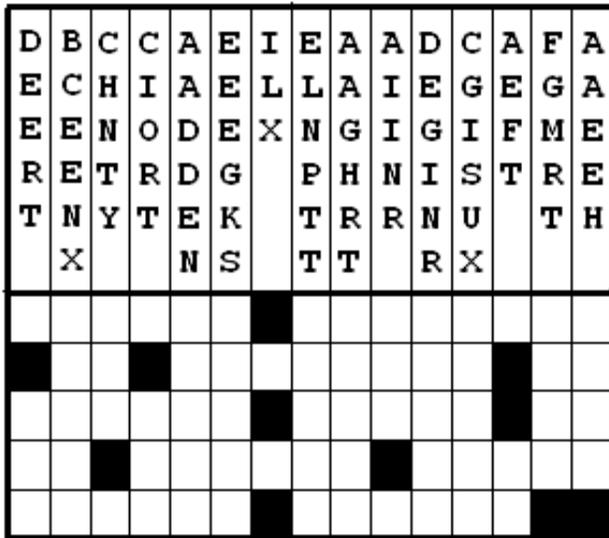
Cumulative Final Exam

Now is the time to use all the things we've learned this year. And cry. In that order.

Describe the story told by each movement of Beethoven's Sixth Symphony and how the music reflects this story. Explain why this is called a "pastoral" symphony.

Suppose a program takes one second to run completely when its input is a list of three simple objects, and it takes one hour when the input is a list of twelve objects. Using order notation, discuss possible time resource requirements.

Explain the differences in notation and structure between sentential and first-order logic. Discuss when each of the two types is used, and how they were developed.

Choose a favorite idiom in your native language and discuss its translation in four other languages, and how the literal and figurative meaning changes. For extra credit, speculate on likely changes in a sixth language you have not studied closely.

Given a recipe which calls for one-third of a cup of corn syrup, suggest substitutes which could be used if onions are not available. Answer the same question for buttermilk and bread crumbs.

Let $f: G \Rightarrow H$ be a homomorphism, and let K be the preimage of the identity element of H. Prove K is a normal subgroup of G. (Hint: Use the first law of isomorphism.)

Outline a brief interactive story (Choose Your Own Adventure) with at least twelve nodes, two comedic endings and two unhappy endings. Flesh out two of the nodes (using second-person narration.) Try to use a setting which is familiar but not stereotypical.

Discuss difficulties encountered in playing the role of Ophelia in the second act of Hamlet. Consider objectives for Ophelia in each scene, how they relate to her overall objective in the play, and how they lead to Ophelia's decision to commit suicide.

Sitka, the sixth-largest city in Alaska, is not well-known but was once capital of the Alaskan territory. Choose three other cities which went from being a capital to relative obscurity, and discuss the economic, political, and environmental causes involved.

Prove that any subset X of the plane contains a maximal convex subset. (Hint: Use Zorn's lemma.) Give an example of X with only one maximal convex subset, and a second X which has more than one.

At the start of first grade, the school bell produces no fear in Mary. However, after she is late several times and chastised for her behavior, she trembles and shows discomfort when the bell rings. Identify the conditioned and unconditioned stimuli and responses.

An n-gon is inscribed in a circle such that the area of the n-gon is one-seventh the area of the circle. Suppose (n-1) of the interior angles of the n-gon are equal. Find (with proof) all possible values for n.