Summary of Student Evaluations

During her time as a graduate student at the University of Wisconsin - Madison Juliette Bruce has held appointments as a teaching assistant for eleven semesters. In her first year Juliette was a teaching assistant for Math 221: Calculus I and the instructor for Math 132, a math course for education majors. In these roles her student evaluations were generally positive with particularly strong student comments. Since then she has held a non-standard teaching assistantship with the Madison Math Circle outreach program for six semesters. More recently Juliette has twice served as a teaching assistant and coordinator for Math 221: Calculus I, and once been the instructor for the accompanying Math 228: Wisconsin Emerging Scholars course. (Math 228 is a course taken in addition to Calculus I to provide students from generally underrepresented groups additional support and community.) In all of these courses her student evaluations were near perfect, and she received a number of glowing student comments. An overview of the student evaluations she has received is below:

Semester	Course #	Course Title	Rating	Overall	Course Percentile
Fall 2019	Math 221	Calculus & Analytic Geometry I	Superior	4.91	100%
Fall 2018	Math 228	Wisconsin Emerging Scholars	Superior	5.00	100%
Fall 2018	Math 221	Calculus & Analytic Geometry I	Superior	5.00	100%
Fall 2018	n/a	Madison Math Circle	n/a	n/a	n/a
Spring 2018	n/a	Madison Math Circle	n/a	n/a	n/a
Fall 2017	n/a	Madison Math Circle	n/a	n/a	n/a
Spring 2017	n/a	Madison Math Circle	n/a	n/a	n/a
Fall 2016	n/a	Madison Math Circle	n/a	n/a	n/a
Spring 2016	n/a	Madison Math Circle	n/a	n/a	n/a
Spring 2015	Math 132	Problem Solving in Algebra, Statistics, & Probability	Satisfactory	3.96	n/a
Fall 2014	Math 221	Calculus & Analytic Geometry I	Satisfactory Plus	4.74	n/a

These ratings were determinate by the Mathematics Department's Committee on Teaching Assistant Performance and Pay, which consists of faculty, academic staff and teaching assistants. The committee bases its rating (Unsatisfactory, Needs Improvement, Satisfactory Minus, Satisfactory, Satisfactory Plus, Superior) on numerical scores and student comments. The overall score is the mean of 14 questions on a scale of 1-5. The course percentile is compared to instructors teaching the same course in recent years, and was only reported beginning in 2018.

Note the (relative) small number of students in a Math 132 class, and the small number of sections make the numerical evaluation scores extremely noisy and unstable. For example, when Juliette taught Math 132 only six out twenty of students completed the student evaluations. As such student comments are extremely important when evaluating someone teaching Math 132. In Juliette's case her comments are quite positive, and indicate she was effective in creating a classroom atmosphere in which students felt comfortable participating. This is generally in line with her evaluations for Math 221, which were exceptional.

Because of the non-standard nature of the Madison Math Circle teaching assistantship student evaluations are not done. Comments from parents and participants are collected, however, and some have been included in the excepted student comments section.

Excerpted Student Comments

Fall 2014 – Math 221 (TA for 2 Discussion Sections)

- In response to the question, "How could the TA improve his/her teaching?"
  - "Our TA is perfect. She is great at teaching math problems and concepts."
  - "She arrives on time and when we don't have questions she has a plan for the whole hour, she has been very effective and helpful in her teaching."
  - "I believe that my TA is doing a great job as is, and does not need to change anything."
- In response to the question, "What do you like most about the TA's teaching?"
  - "She gets the whole class to participate."
  - "She is very clear and helpful, and she really cares about our learning."
  - "Our TA is very encouraging and optimistic. She treats everyone fairly. She is great at solving math problems of varying difficulties."
  - "Very friendly and willing to help; tries to create a comfortable atmosphere open to questions and discussion."
  - "She is always there for us and is willing to help us in any shape, way, or form. Holds review sessions, most TA's don't."
  - "She is willing to find extra time to help out."
  - "She takes a very confusing lecture and makes it understandable. If it weren't for discussion my grade would be far lower."
  - "I like that my TA is always willing to help, and honestly wants us all to succeed, which is reflected in her teaching methods."
- In response to the question, "Any further comments?"
  - "TA should be the professor."
  - "Very good TA!"
  - "I think Juliette Bruce is a very good TA."
  - "By far one of the best TA's."
  - "She is essentially the best math teacher I've ever had."
- Misc. comments
  - "The TA in charge of discussion appears to really care, ..."
  - "If it weren't for your discussion I would still be lost ..."
  - "Thank you for all that you have done. I have thoroughly enjoyed your discussion, you made math actually enjoyable at 8:50 in the morning. I also found your discussion very helpful compared to lecture. I appreciate it!"

Spring 2015 – Math 132 (Instructor for 1 Discussion Section)

- In response to the question, "What do you like most about the TA's teaching?"
  - "Constantly open to changing teaching style based on what we need."

- "Willingness to talk through confusion and answer questions."

- "Wanted us to succeed – tried to make concepts connect to our lives."

- "She is very clear spoken and is always willing to go above and beyond to meet or clarify mistakes or confusion."

- Misc. comments

  - "I really appreciate your willingness to help and desire for us succeed – especially when it comes to showing the material differently, or trying a different method to the course concepts."

Spring 2016/2017, Fall 2016/2017 – Madison Math Circle (TA Student Organizer)

- Each semester we collect comments from parents, since I have been an organizer these have included:

  - "You guys are doing great stuff! Keep up the wonderful work!"

  - "Great job. This is a fantastic service that you provide. And all your presenters are so enthusiastic. Thank you for sharing your love of mathematics with us all."

  - "My daughter loves the Math Circle and we're very grateful for this opportunity. It has been an amazing experience for her!"

  - "Thank you for holding this course. My children like to be challenged in math and this is a great opportunity for them to experience math outside the box. They especially like when there is hands on group activities."

  - "[Student] struggles with Math, not her strong suit, so I very much appreciate this resource!"

Fall 2018 – Math 221/228 (TA/Instructor for 1 Discussion Section)

- In response to the question, "What do you like most about the instructor's teaching?"

  - "Juliette made sure that I knew all the material and was comfortable with it. When I did have confusion she was really understanding and broke down problems step by step through asking me questions and having me solve through the work in ways I understood. She is always so positive, supportive, and enthusiastic in class and made me excited to learn every day. Additionally, she provided challenging material broken down in simpler ways so we were able to expand our problem solving skills of complex problems in interesting attainable ways."

  - "She explains thoroughly step by step, which makes learning the material much easier to understand. Anytime I have any questions or am confused in any way, she makes the time to explain it and I'd able to explain it in more than one way so that I can understand. She?s also super supportive and helpful and creates and really great environment in which I look forward to coming to Discussion because I know it?ll be productive and helpful for me."

  - "She always has a simpler way to explain stuff - Respectful - She brings interesting topics to class - challenges us effectively"

  - "I really appreciate how she explains things very clearly and goes through problems step-by-step. I also feel that she does an amazing job of preparing us for what is going to be on exams and explains exactly how we should write our answers to be the most clear possible in our understanding. She really knows what she is talking about, and is able to effectively communicate that understanding to someone who may be confused on the material."

  - "She is very effective and takes time to make sure that everyone understands the materials that are taught in lecture. It is very obvious that she cares about how we do and that we are comfortable asking questions."

- "Juliette will clearly work through all the problems for us. She has a good sense of what material we understand and what we don't understand. Additionally, she is very supportive and encouraging. Juliette will effectively use time and I never feel like coming to class is ever a waste."

- In response to the question, 'How could the instructor improve his/her teaching?"

  - "Hmmm, tough question. Can a non massless particle reach the speed of light? Not really. The same goes here, I don?t think there's a better teaching atyle than this"

  - "I think she already does a fantastic job teaching this course and do not have any recommendations for improvements at this time."

  - "Juliette is honestly the best math instructor I've ever had so I can't think of many ways she could improve her teaching."

- Misc. comments

  - "I've always struggle with math and I've had a lot of teachers that didn't believe in me so because of this I've always dreaded math courses. But Juliette always showed she cared, was constantly encouraging, believed in our class, and taught the material really clearly. From her constant availability to help and great instructing, her class became one of my favorites and I am more successful in a math course than I've ever been before."

  - "I would highly recommend this instructor to anyone. She is incredibly good at explaining challenging concepts and is also a very kind and caring individual."

  - "Juliette is an amazing TA and she has really made me interested in calculus."

  - "She's one of if not the best math teacher I?ve had and I strongly recommend anyone to take a class with her."

  - "I went to the review today and I just wanted to let you know that everyone around me kept commenting about how good of a teacher you are. The people behind me said many times that they wished that you were our professor instead of [the professor]. I just wanted to let know that everyone was saying nice things about you and I am really so blessed to have had you for a TA :) "

  - "I am sending this email to let you know that I appreciate all the support you have given us this semester. It has been a true pleasure being in your class this semester. And even though, I did not expect to learn much this semester, you proved me wrong so thank you. "

Fall 2019 – Math 221 (TA for 2 Discussion Sections)

- In response to the question, 'How could the instructor improve his/her teaching?"

  - "She is the best TA I have had and I have learned so much from this discussion."

  - "I really appreciate how available Juliette is and how she genuinely cares about my understanding and success in this class. I have a slower processing speed than other students and therefore require testing accommodations. Juliette was very understanding about it and worked with me to make sure we had a plan in place so I can feel confident with this class. She is also willing to work with me one on one if there is a specific problem I am not understanding or concept I want to talk through. Whenever she is explaining problems she walks through step by step which is very clear and helpful. Overall she is the best TA I have had here and I love everything about how she teaches"

  - "She really seemed to care about each of her students and was extremely good at explaining problems and answering everyones issues. Overall, I felt she was very fair and is my favorite TA

this semester. She goes over everything very effectively and does a very good job about clearly explaining and breaking down a complex subject."

– "She went around and tried helping each student instead of giving broad answers to the whole class. She cared about each student's success in the class and tried her best to make everyone understand the material."

– "Juliette Bruce has been, by far, my favorite TA because of her ability to relay the and teach the material. She is especially good at clarifying difficult material from lecture. For example, when we covered the delta epsilon process in the actual definition of a limit the concept was difficult for most students to wrap there head around but Juliette was able to clarify this topic enough where I ended up teaching my fellow students in a way they understood it by using the way she taught my discussion group. This is a small example but I by far have retained the most information from my math discussion compared to all of my other discussion sections and I believe this is due to our TA."

– "Juliette is an incredibly personable teacher. The charisma, humor, and brightness she brings into the classroom both brightens students day, and in NO WAY detracts from the con tent we are learning. She is able to fully describe the process of all of the problems that we work on, as well as offer ing her own tips and tricks to help further our understanding. Tuesday's are my busiest day, and I often find my self skipping some of my Tuesday classes, but Juliette's class I will never willing miss. As difficult as I find this course, Juliette goes above and beyond in the reinforcement of ideas went over in lecture, and her ability to clarify content is very helpful."

– "Juliette obviously wants us to succeed not only in math but in life. She is always making sure we know our resources especially when it comes to health. She also always wishes us a good day/weekend and that is awesome."

DATE: January 10, 2020

TO: Bruce,Juliette

FROM: TA Evaluation Committee

SUBJECT: Fall 2019 MATH 221 Evaluation

You will find your complete TA evaluation results at aefis.wisc.edu. You will need to log in with your net ID and password. For your information:

The percentage of your students who agreed or strongly agreed with the statement "The instructor was an effective teacher" (question 13) is **100%**. This places you at the **100th** percentile of all TAs who taught a similar course this semester and at the **100th** percentile of all TAs teaching a mathematics course this semester.

CTAPP has read your teaching evaluations and instructor feedback. CTAPP has deemed your teaching to be **superior**. Congratulations!

Here are some selected student quotes CTAPP would like to highlight:

Juliette is an incredibly personable teacher. The charisma, humor, and brightness she brings into the classroom both brightens students day, and inNO WAY detracts from the con tent we are learning. She is able to fully describe the process of all of the problems that we work on, as well as offering her own tips and tricks to help further our understanding. Tuesday's are my busiest day, and I often find my self skipping some of my Tuesday classes, but Juliette's class I will never willing miss. As difficult as I find this course, Juliette goes above and beyond in the reinforcement of ideaswent over in lecture, and her ability to clarify content is very helpful.

I really appreciate how available Juliette is and how she genuinely cares about my understanding and success in this class. I have a slowerprocessing speed than other students and therefore require testing accommodations. Juliette was very understanding about it and worked with meto make sure we had a plan in place so I can feel confident with this class. She is also willing to work with me one on one if there is a specificproblem I am not understanding or concept I want to talk through. Whenever she is explaining problems she walks through step by step which is veryclear and helpful. Overall she is the best TA I have had here and I love everything about how she teaches.

Here is feedback from your teaching observer/mentor:

n/a

CTAPP has the following feedback for you:
You are doing an amazing job!!!

We recommend that you read your students' comments carefully to find in what areas you are doing well and where you should improve. Read the enclosed Teaching Evaluation Feedback handout for guidance on interpreting your results. If you have questions about your evaluations or this ranking, please speak to one of the committee members.

TA EVALUATION COMMITTEE

Daniel Erman	Justin Sukiennik	Jaeun Park
Xianghong Gong	Michel Alexis	Kyriakos Sergiou
Fabian Waleffe	Geoff Bentsen	Rajula Srivastava
Bobby Grizzard	Solly Parenti	Polly Yu
Oh Hoon Kwon		

DATE**:** December 27, 2018

TO**:** Bruce,Juliette

FROM**:** TA Evaluation Committee

SUBJECT: Fall 2018 MATH 221 Evaluation

You will find your complete TA evaluation results at aefis.wisc.edu. You will need to log in with your net ID and password. For your information:

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Here are some selected student quotes CTAPP would like to highlight:
"Juliette made sure that I knew all the material and was comfortable with it. When I did have confusion she was really understanding and broke down problems step by step through asking me questions and having me solve through the work in ways I understood. She is always so positive, supportive, and enthusiastic in class and made me excited to learn every day. Additionally, she provided challenging material broken down in simpler ways so we were able to expand our problem solving skills of complex problems in interesting attainable ways.", "I've always struggle with math and I've had a lot of teachers that didn't believe in me so because of this I've always dreaded math courses. But Juliette always showed she cared, was constantly encouraging, believed in our class, and taught the material really clearly. From her constant availability to help and great instructing, her class became one of my favorites and I am more successful in a math course than I've ever been before."

Here is feedback from your teaching observer/mentor:
Juliette really cares, puts in an enormous effort, to help her students before the first exam. She is the lead TA for one of my lectures.Her work sheets, which are shared with the other TAs and are used in all discussions, are excellent and comprehensive. This makes the discussions of all other TAs much better. I really appreciate her work.

CTAPP has the following feedback for you:

    Amazing job!

    We recommend that you read your students' comments carefully to find in what areas you are doing well and where you should improve. Read the enclosed Teaching Evaluation Feedback handout for guidance on interpreting your results. If you have questions about your evaluations or this ranking, please speak to one of the committee members.

TA EVALUATION COMMITTEE

Daniel Erman	Bobby Grizzard	Jaeun Park
Sergey Bolotin	Kyle Martinez	Soumya Sankar
Xianghong Gong	Justin Sukiennik	Kyriakos Sergiou
Chanwoo Kim	Eva Elduque	Vladimir Sotirov
Mariya Soskova	Christian Geske	Polly Yu
Soledad Benguria	Vefa Goksel	

Discussion Syllabus

Course: Math 221 - Calculus I
Course Homepage: See Canvas.

Instructor: Juliette Bruce
Email: `juliette.bruce@math.wisc.edu`
Office: Van Vleck 418
Office Hours: M 10:00am-11:00am, T 1:00pm-2:00pm, by appointment

Contacting Me

The best way to contact me regarding logistics of the course is via email at the address listed above. I will do my best to respond to all emails within 24 hours (48 hours on weekends), however, to help me in this regard please have Math 221 in the subject line so I do not miss your email This said email is not an effective way to discuss mathematics, and so if you have a question regarding the material – other than a quick clarification – please come to office hours, or schedule a time to meet, so we can converse in person. (You can also always ask questions via Piazza, which will be checked regularly by instructors in the course – not necessarily me.) As a final note, in compliance with FERPA I will not discuss grades via email.

Office Hours

As noted above currently I have office hours Monday 10:00am-11:00am and Tuesday 1:00pm-2:00am, as well as by appointment. These will all occur in my office VV 418 on the fourth floor of Van Vleck. If you would like to meet me at a different time please email me at the email listed above. I strongly encourage you to try and attend office hours if you feel you have any confusion of questions regarding the material. As I will say more on in a minute the more I understand how you are thinking about the material the more effective I can be in helping guide your learning. (Note: I may adjust my office hours if a personal conflict arrises.)

Learning Environment

Unlike what some might believe math is a social endeavor, and is not done alone. As such we will often spend most of class working and learning in small groups and from student presentations. This means it is critical that we have an inclusive and supportive classroom community where everyone feels comfortable to contribute. With this in mind we have the following minimal discussion rules:

1. **No one is wrong:** When one does math there will be times when one makes mistakes – occasionally even really silly mistakes. (For example, on a quiz I once incorrectly said 27 is a prime number.) However, making mistakes is not necessary a reflection of ones mathematical abilities, and often is really helpful when it comes to learning mathematics. (You can't figure out what you don't know until you make a mistake.). Keep this in mind when critiquing someone work, and try and avoid telling people "they are wrong", but instead point out where there is an error or confusion.

2. **Address the problem not the person:** Similarly, if you are disagree with someone's work, answer, explanation, etc. voice your feelings. However, when you do this focus your remarks on the problem at hand, not the person presenting the problem.

3. **Expect Respect:** Respect your fellow classmates and I, and in turn expect that we'll respect you.

This list is not inclusive and I also expect everyone to follow any additional classroom mores we agree to as a class. (That is why there is additional white space here for you to write add any additional items.)

Accommodations

In order to maintain an inclusive learning environment I wish to be fully accommodating to all students with disabilities. Please let me know as soon as possible if you need accommodations in the curriculum, instruction, or assessments in this course to enable you to fully participate. Additionally you should contact Prof. Sean Paul to inform him as soon as possible. I will attempt to maintain confidentiality of the information you share with me. [1]

Placement

It is department policy not to advise students on which math courses to take. If at some point you feel that this is not the right math course for you, either you feel you have mastered the subject matter or feel you need to better understand perquisite material, please contact the math placement office at `placement@math.wisc.edu`. More information regarding math placement may also be found online at `math.wisc.edu/placement/`. Note the earlier you contact the placement office the more likely there is something they can do to help you.

Wait-list

Per department policy I have no control over the wait list for this course. If you are on the wait-list for this course/section or another math course all questions regarding the wait-list should be direct to the math placement office at `placement@math.wisc.edu`.

Calculators

For various reasons calculators will not be allowed during exams and quizzes, and as such we will not be using them in class. That said I of course cannot stop you from using them when you are studying or doing homework. However, I would strongly advise against this. Performing arithmetic and algebraic operations is a skill, and like any skill your ability to do this quickly and accurately wains when you do not practice them. So if you use your calculator as a crutch when studying or doing homework do not be surprised when on an exam you struggle with doing the required arithmetic and algebra without it. TLDR: If you use calculators when doing homework you'll most like struggle on the exams.

Additional Help

If you feel like you may need additional help (in addition to office hours) there are many on campus resources offering varying forms of help. For example, the Math Lab (`http://www.math.wisc.edu/undergraduate/mathlab`) offers free drop in assistance and Greater University Tutoring Service (GUTS - `http:guts.studentorg.wisc.edu`) provides free peer tutoring. A fairly comprehensive list of these resources may be found `math.wisc.edu/tutorial_program/math-class-help`. (Remember: It is much better to get help when you first have questions or are confused; rather than wait until you are completely lost.)

Welcoming Message

As a diverse group, the Mathematics Department strives to foster an open and supportive community in which to conduct research, to teach, and to learn. In accordance with these beliefs and section 36.12 of the Wisconsin Statutes, the Mathematics Department affirms that all community members are to be

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[1] Adapted from "Examples of Syllabus Statements Inviting Students w/Disabilities to Request Accommodations in the Classroom" - McBurney Disability Resource Center, UW Madison

treated with dignity and respect and that discrimination and harassment will not be tolerated. We further commit ourselves to making the department a supportive, inclusive, and safe environment for all students, faculty, staff, and visitors, regardless of race, religion, national origin, sexual orientation, gender identity, disability, age, pregnancy, or any other aspect of identity. For more information, see `https://math.wisc.edu/climate`.

I am firmly committed to promote an anti-discriminatory environment where everyone feels safe and welcome. As such, you are expected to treat your instructor and all other participants in the course with courtesy and respect. Your comments to others should be factual, constructive and free from harassing statements. Students need to contribute in intelligent, positive, and constructive manners in the course.

Campus Resources

As a student you may experience a range of issues that can cause barriers to learning. These might include strained relationships, anxiety, high levels of stress, alcohol/drug problems, feeling down, or loss of motivation. UHS is here to help with these or other issues you may be experiencing. You can learn about the free, confidential mental health services available on campus by calling (608)265-5600 or visiting www.uhs.wisc.edu. Help is always available.

There are several options for confidential support, counseling, and medical services for student victims of sexual assault, dating violence, domestic violence on and off the UW-Madison campus. Student victims also have options for reporting to campus and/or law enforcement. For information about all of these options, please visit `http://www.uhs.wisc.edu/assault/sa-resources.shtml`. Remember you are not alone. Help is always available.

Academic Integrity

By enrolling in this course, each student assumes the responsibilities of an active participant in UW-Madison?s community of scholars in which everyone?s academic work and behavior are held to the highest academic integrity standards. Academic misconduct compromises the integrity of the university. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these acts are examples of academic misconduct, which can result in disciplinary action. This includes but is not limited to failure on the assignment/course, disciplinary probation, or suspension. Substantial or repeated cases of misconduct will be forwarded to the Office of Student Conduct & Community Standards for additional review. For more information, refer to `https://www.students.wisc.edu/doso/academic-integrity/`.

Wisconsin Emerging Scholars (WES) Syllabus

Course: Math 228 - WES Calculus Supplement
Course Homepage: See Canvas.
Times & Locations: MWF 11:00am - 11:50am in 38 Ag Hall

Instructor: Juliette Bruce
Email: juliette.bruce@math.wisc.edu
Office: Van Vleck 418
Office Hours: M 12:00pm-1:00pm, Th 10:00am-11:00am, by appointment

Course Designations: None
Instructional Mode: Blended
Credits: 2

Course Description

This course covers differential and integral calculus, plane analytic geometry, applications; transcendental functions, etc. The Math 221-222 sequence is the first two semesters of the standard three-semester calculus sequence, completed with 234, which is normally required for all higher level math courses and should be taken by those preparing for major study in mathematics, the physical sciences, computer sciences, or engineering. It is also recommended for students in the social and life sciences who may want a more substantial introduction to calculus than is offered in the Math 211-213 sequence.

Prerequisites

The prerequisites for this course as listed on the course guide are: (I) Advanced math competency-algebra and suitable placement scores, or Math 112 and (II) Advanced math competency-trigonometry and suitable placement scores, or Math 113; or Math 114. These prerequisites are enforced by the department, and I have no control over this. If you feel you are in the wrong course please see the "Placement" below.

Learning Objectives

By the end of Math 228 you should be able to:

- Apply differential calculus to quantify rates of change, and in particular to model physical and biological phenomena.

- Analyze the behavior of functions of one variable, including their asymptotic behavior, local behavior and existence of extrema.

- Apply integral calculus to model the cumulative effects of continuous processes.

- Articulate mathematical knowledge and understanding of differential and integral calculus in a written context.

How Credit Hours are met by the Course:

The two credit hours are met by two 50-minute meetings and a minimum of four hours of out of class student work per week for 15 weeks.

Contacting Me

The best way to contact me regarding logistics of the course is via email at the address listed above. I will do my best to respond to all emails within 24 hours (48 hours on weekends), however, to help me in this regard please have Math 221 in the subject line so I do not miss your email This said email is not an effective way to discuss mathematics, and so if you have a question regarding the material – other than a quick clarification – please come to office hours, or schedule a time to meet, so we can converse in person. (You can also always ask questions via Piazza, which will be checked regularly by instructors in the course – not necessarily me.) As a final note, in compliance with FERPA I will not discuss grades via email.

Office Hours

As noted above currently I have office hours Monday 12:00pm-1:00pm and Thursday 10:00am-11:00am, as well as by appointment. These will all occur in my office VV 418 on the fourth floor of Van Vleck. If you would like to meet me at a different time please email me at the email listed above. I strongly encourage you to try and attend office hours if you feel you have any confusion of questions regarding the material. As I will say more on in a minute the more I understand how you are thinking about the material the more effective I can be in helping guide your learning. (Note: I may adjust my office hours if a personal conflict arrises.)

Grading

Since you are in this section that means you are actually enrolled in two courses Math 221 and Math 228. As such you will be given two grades at the end of the semester:

- Your grade for the five credits of Math 221 will be determined as laid out in the Math 221 syllabus. This breakdown will be the same for all discussions in Prof. Meyer's lecture. If you have any questions regarding your grade for Math 221 please consult the course syllabus, or email me.

- Your grade for the two credits of Math 228 will be based on four components:

  1. Homework 60%: Throughout the semester I will occasionally give short homework assignments, which will be collected and graded. These homework assignments are not meant to be tedious and, or to substantially to your workload. They are intended to be a way to help hold you accountable to the material, and help me know how students are understanding the material.

  2. Team Quizzes 25%: At various points throughout the semester we will have short team quizzes. These quizzes will always be announced at least one class period in advance.

  3. Office Hours 15%: Throughout the semester I expect you attend a office hours at least twice. One of your visits to office hours must occur before October 10, 2018 – the date of the first exam. If you have conflicts with my scheduled office hours, or do not believe you will be able to attend two office hours for some reason, please contact me as soon as possible.

  4. Attendance: Attendance in discussion is mandatory, and will count towards your final grade in Math 228. You are allowed four absences, barring emergency, before your grade is affected. For each absence after your fourth your final grade will be lowered by half of a letter grade. For example, if at the end of the semester your grade based on the above components (worksheets/homework, team quizzes, and office hours) is an A/B and you miss five discussions then your final grade will be a B; miss six discussions and your grade would be a B/C, etc. *If you know you have to miss a discussion, especially a number of discussions, please talk to me as soon as possible.*

Grading Scale

The grading scale for this course will be no less lenient than the standard university-wide grading scale:

- A - 90%

- A/B - 88%

- B - 80%

- B/C - 78%

- C - 70%

- D - 60%

- F - less than 60%

As the instructor I reserve the right to modify this grading scale, and "curve" the course, at the end of the semester. However, if I do I it will only work in your favor.

Learning Environment

Unlike what some might believe math is a social endeavor, and is not done alone. As such we will often spend most of class working and learning in small groups and from student presentations. This means it is critical that we have an inclusive and supportive classroom community where everyone feels comfortable to contribute. With this in mind we have the following minimal discussion rules:

1. **No one is wrong:** When one does math there will be times when one makes mistakes – occasionally even really silly mistakes. (For example, on a quiz I once incorrectly said 27 is a prime number.) However, making mistakes is not necessary a reflection of ones mathematical abilities, and often is really helpful when it comes to learning mathematics. (You can't figure out what you don't know until you make a mistake.). Keep this in mind when critiquing someone work, and try and avoid telling people "they are wrong", but instead point out where there is an error or confusion.

2. **Address the problem not the person:** Similarly, if you are disagree with someone's work, answer, explanation, etc. voice your feelings. However, when you do this focus your remarks on the problem at hand, not the person presenting the problem.

3. **Expect Respect:** Respect your fellow classmates and I, and in turn expect that we'll respect you.

This list is not inclusive and I also expect everyone to follow any additional classroom mores we agree to as a class. (That is why there is additional white space here for you to write add any additional items.)

Accommodations

In order to maintain an inclusive learning environment I wish to be fully accommodating to all students with disabilities. Please let me know as soon as possible if you need accommodations in the curriculum, instruction, or assessments in this course to enable you to fully participate. Additionally you should contact Prof. Sean Paul to inform him as soon as possible. I will attempt to maintain confidentiality of the information you share with me. [1]

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[1] Adapted from "Examples of Syllabus Statements Inviting Students w/Disabilities to Request Accommodations in the Classroom" - McBurney Disability Resource Center, UW Madison

PLACEMENT

It is department policy not to advise students on which math courses to take. If at some point you feel that this is not the right math course for you, either you feel you have mastered the subject matter or feel you need to better understand perquisite material, please contact the math placement office at `placement@math.wisc.edu`. More information regarding math placement may also be found online at `math.wisc.edu/placement/`. Note the earlier you contact the placement office the more likely there is something they can do to help you.

WAIT-LIST

Per department policy I have no control over the wait list for this course. If you are on the wait-list for this course/section or another math course all questions regarding the wait-list should be direct to the math placement office at `placement@math.wisc.edu`.

CALCULATORS

For various reasons calculators will not be allowed during exams and quizzes, and as such we will not be using them in class. That said I of course cannot stop you from using them when you are studying or doing homework. However, I would strongly advise against this. Performing arithmetic and algebraic operations is a skill, and like any skill your ability to do this quickly and accurately wains when you do not practice them. So if you use your calculator as a crutch when studying or doing homework do not be surprised when on an exam you struggle with doing the required arithmetic and algebra without it. TLDR: If you use calculators when doing homework you'll most like struggle on the exams.

ADDITIONAL HELP

If you feel like you may need additional help (in addition to office hours) there are many on campus resources offering varying forms of help. For example, the Math Lab (`http://www.math.wisc.edu/undergraduate/mathlab`) offers free drop in assistance and Greater University Tutoring Service (GUTS - `http:guts.studentorg.wisc.edu`) provides free peer tutoring. A fairly comprehensive list of these resources may be found `math.wisc.edu/tutorial_program/math-class-help`. (Remember: It is much better to get help when you first have questions or are confused; rather than wait until you are completely lost.)

WELCOMING MESSAGE

As a diverse group, the Mathematics Department strives to foster an open and supportive community in which to conduct research, to teach, and to learn. In accordance with these beliefs and section 36.12 of the Wisconsin Statutes, the Mathematics Department affirms that all community members are to be treated with dignity and respect and that discrimination and harassment will not be tolerated. We further commit ourselves to making the department a supportive, inclusive, and safe environment for all students, faculty, staff, and visitors, regardless of race, religion, national origin, sexual orientation, gender identity, disability, age, pregnancy, or any other aspect of identity. For more information, see `https://math.wisc.edu/climate`.

I am firmly committed to promote an anti-discriminatory environment where everyone feels safe and welcome. As such, you are expected to treat your instructor and all other participants in the course with courtesy and respect. Your comments to others should be factual, constructive and free from harassing statements. Students need to contribute in intelligent, positive, and constructive manners in the course.

Campus Resources

As a student you may experience a range of issues that can cause barriers to learning. These might include strained relationships, anxiety, high levels of stress, alcohol/drug problems, feeling down, or loss of motivation. UHS is here to help with these or other issues you may be experiencing. You can learn about the free, confidential mental health services available on campus by calling (608)265-5600 or visiting www.uhs.wisc.edu. Help is always available.

There are several options for confidential support, counseling, and medical services for student victims of sexual assault, dating violence, domestic violence on and off the UW-Madison campus. Student victims also have options for reporting to campus and/or law enforcement. For information about all of these options, please visit `http://www.uhs.wisc.edu/assault/sa-resources.shtml`. Remember you are not alone. Help is always available.

Academic Integrity

By enrolling in this course, each student assumes the responsibilities of an active participant in UW-Madison?s community of scholars in which everyone?s academic work and behavior are held to the highest academic integrity standards. Academic misconduct compromises the integrity of the university. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these acts are examples of academic misconduct, which can result in disciplinary action. This includes but is not limited to failure on the assignment/course, disciplinary probation, or suspension. Substantial or repeated cases of misconduct will be forwarded to the Office of Student Conduct & Community Standards for additional review. For more information, refer to `https://www.students.wisc.edu/doso/academic-integrity/`.

Worksheet #17 - A Famous Optimization Problem About Slides

Instructions: *Listen to your TA's instructions. There are substantially more problems on this worksheet than we expect to be done in discussion, and your TA might not have you do problems in order. The worksheets are intentionally longer than will be covered in discussion in order to give students additional practice problems they may use to study. Do not worry if you do not finish the worksheet. :)*

RUNNING THROUGH THE BEACH

1. On vacation you arrive at the beach, and cannot wait to join your friends in the water and cool off. In order to join your friends in the lake you need to run across the parking lot and then across the beach as shown in the diagram below. (All units are in meters.)
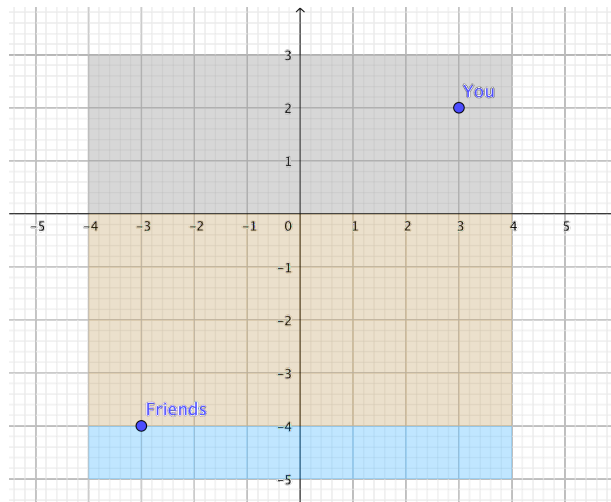
(a) How far are your friends from you when you are standing in the parking lot.

(b) Suppose that in the parking lot you can run at a (constant) speed of 2 m/s, but on the beach the sand slows you down, and you are only able to run at a (constant) speed of .75 m/s. How long would it take you reach your friends if you take the shortest possible path?

(c) How long would it take you to reach your friends if you take the path shown in red?
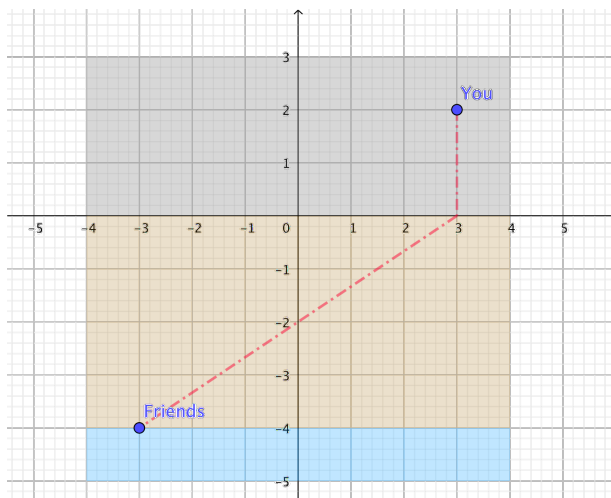
(d) How long would it take you to reach your friends if you take the path shown in red?
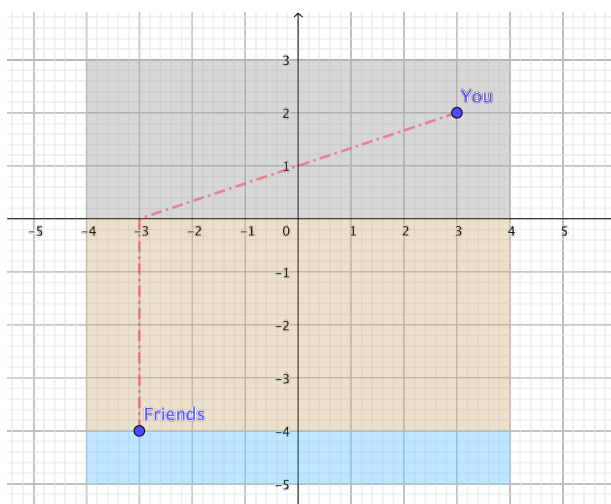
(e) We now wish to find the distance for a "general" path, and how long it will take us to traverse this path and reach our friends. Write down expressions for the distance of the path, and for the how long it will take you to run the path in terms of a, b, x, and ℓ.
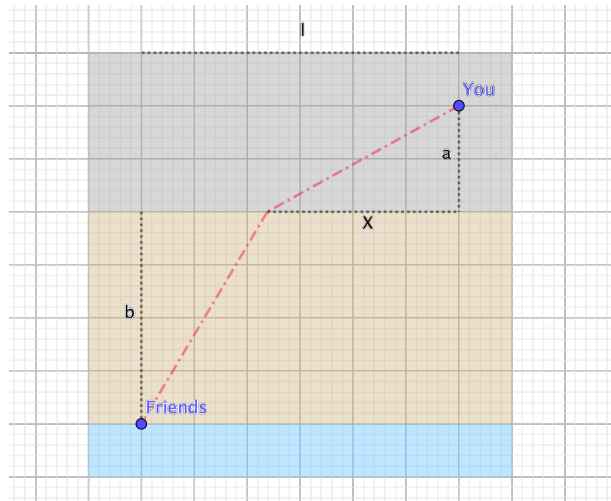
(f) Since a, b, and ℓ are all constants we may view the expressions writen above as functions of x. Thinking of the time it takes you to reach your friends as a function of x compute its derivative.

(g) In the diagram below solid black line is perpendicular to the boundary between the parking lot and the beach. Compute $\sin(\theta_1)$ and $\sin(\theta_2)$ as in the diagram below in terms of a, b, x and ℓ:
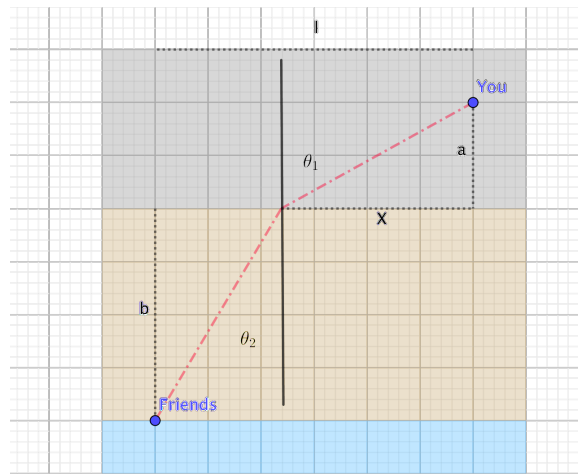

(h) Combining parts (f) and (g) deduce a condition on $\sin(\theta_1)$ and $\sin(\theta_2)$ minimizing the total amount of time it takes you to reach your friend.

A Hard Geometry Problem

1. Imagine a circle (pink) of radius D rolling along the ceiling with a point marked P on the circle. As the circle rolls the path of point P traces out a curve (yellow) as shown in the picture below. The goal of this exercise is to begin exploring the path.
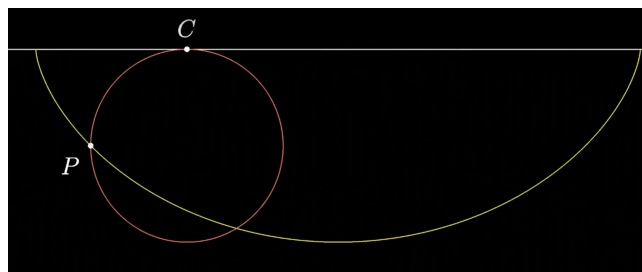

(a) Consider the circle given by the equation $x^2 + y^2 = 4$. Compute the equation of the line going through the point $(0,0)$ and the point $(\sqrt{2}, \sqrt{2})$. Compute the equation of the line tangent to the circle at the point $(\sqrt{2}, \sqrt{2})$. Draw both on the diagram below. Do you see a relationship?
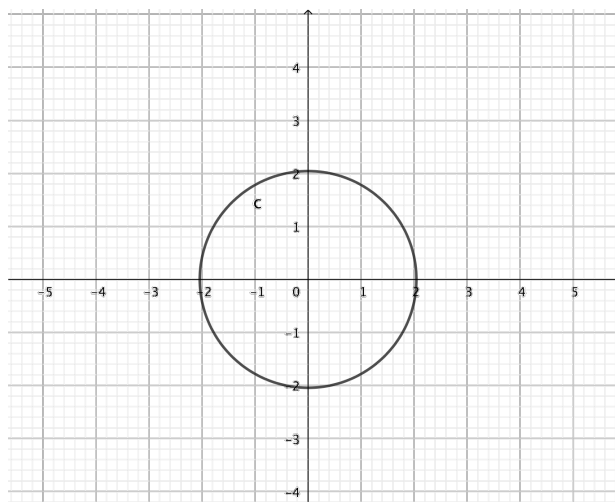

(b) More generally can you guess a relationship between the tangent line to a circle at a point A and a line of radius passing through point A?

(c) Consider the line segment between the point C and point P. Drawing a circle (green) centered at C which has CP as a radius gives the picture below. What can we saw about the line tangent to the yellow curve at P and the line segment CP?
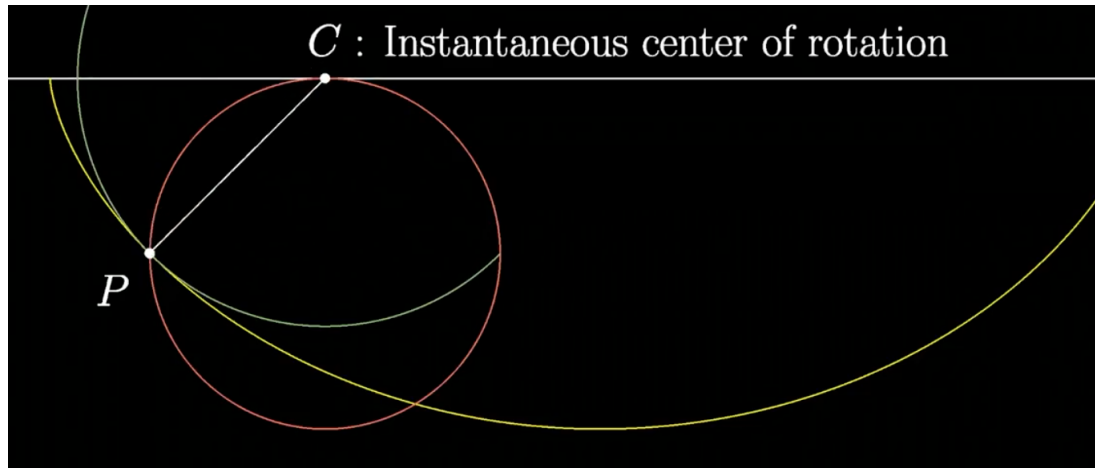
(d) Using our answer to the previous part we know we can draw a right triangle inside the pink circle. Using this triangle find the length of CP in terms of D and θ
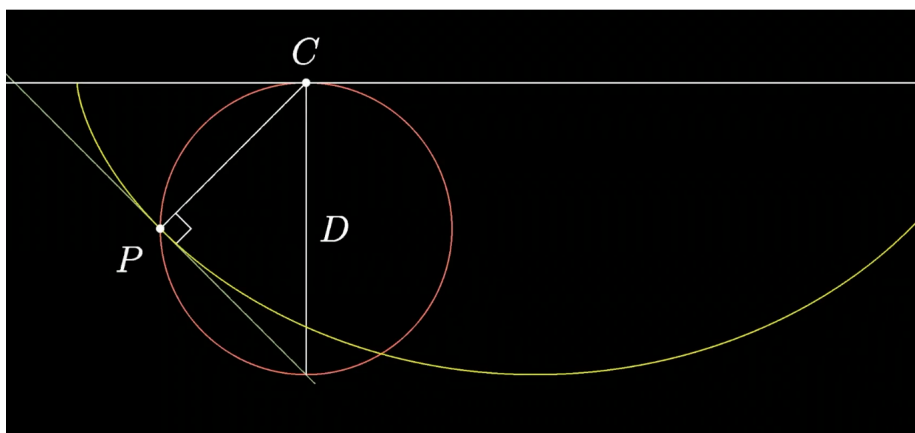
(e) Finally using similar triangles show find the distance P is from the ceiling (i.e. the horizontal line).
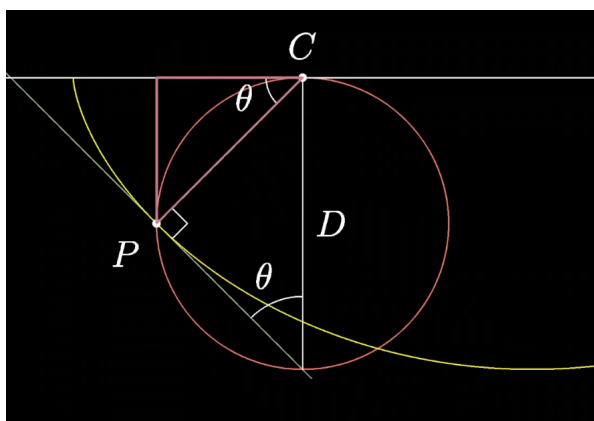
Worksheet #2 - Function Composition & Trigonometric Functions

Instructions: *Listen to your TA's instructions. There are substantially more problems on this worksheet than we expect to be done in discussion, and your TA might not have you do problems in order. The worksheets are intentionally longer than will be covered in discussion in order to give students additional practice problems they may use to study. Do not worry if you do not finish the worksheet. :)*

Warm-Up

1. Find the equation of the line passing through the points $(11, 23)$ and $(6, 5)$.

2. Find the equation of the line passing through the points $(2, 3)$ and $(-13, 17)$.

3. Find the equation of the line passing through the points $\left(1, \frac{1}{2}\right)$ and $\left(\frac{3}{1}, 1\right)$.

4. Find the equation of the line passing through the points $\left(\frac{3}{5}, \frac{2}{3}\right)$ and $(7, 12)$.

5. Factor $x^3 + 2x^2 + x$.

6. Factor $3y^2 - 8y + 5$.

7. Factor $x^3 + 3x^2 - 4$.

8. Factor $x^2 + \frac{x}{4} - \frac{3}{8}$.

9. Factor $t^4 + 10t^3 + 35t^2 + 50t + 24$.

10. Find the equation of the line parallel to the line $y = \frac{1}{8}x + 11$ passing through the point $(4, 5)$.

11. Find the equation of the line perpendicular to the line give by $y = 2x + 3$ passing through the point $(1, 2)$.

Function Composition & Inverse Functions

If f and g are functions, then the composition of f and g, which we denote $(f \circ g)(x)$, is defined to be $(f \circ g)(x) = f(g(x))$. Further if we have the that $f(g(x)) = x$ for all x in the domain of g and $g(f(y)) = y$ for all y in the domain of f, we say that g is the "inverse function" of f. If f has an inverse function we generally call it $f^{-1}(x)$.

1. In general $(f \circ g)$ is not equal to $(g \circ f)$. Find two functions f and g such that $(f \circ g) \neq (g \circ f)$.

2. If $f(x) = \dfrac{1}{x+1}$, find $\underbrace{f(f(\cdots\cdots(f(x))\cdots)}_{\text{2018 times}}$ and $\underbrace{f^{-1}(f^{-1}(\cdots\cdots(f^{-1}(x))\cdots)}_{\text{2018 times}}$.

3. Find a function which is equal to its own inverse function.

4. Find a function, which *does not* have an inverse.

0.1 Graphing Inverse Functions

1. Let $f(x)$ be the function described by the table below. Completely the table describing $f^{-1}(x)$.

x	3	10	25	100
$f(x)$	2	4	9	25

| x				
$f^{-1}(x)$				

2. If $h(t) = 3t - 1$ find $h^{-1}(t)$. Graph both $h(t)$ and $h^{-1}(t)$.

3. Suppose $f(x)$ is an invertible function. Can you describe how the graph $y = g(x)$ and $x = g^{-1}(y)$ relate?

4. Show that if f is a function which has an inverse, then $f(a) = f(b)$ implies $a = b$. Using this find a way to test whether a function $f(x)$ has an inverse by looking at the graph of $y = f(x)$.

Trigonometric Functions

One way of defining the trigonometric functions $\sin(\theta)$ and $\cos(\theta)$ is via the unit circle. In particular, if we draw the circle of radius one centered at the origin (i.e. the circle given by the equation $x^2 + y^2 = 1$) then line making an angle θ with the positive x-axis intersects this circle at the point $(\cos(\theta), \sin(\theta))$.
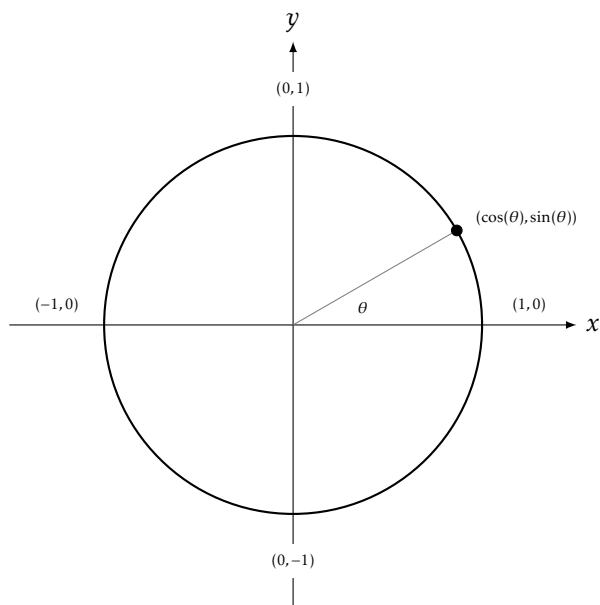
1. Using the unit circle definition of sin and cos explain why the following identities are true:

(a) $\sin(\theta + \pi) = -\sin(\theta)$

(b) $\cos(\theta + \pi) = -\cos(\theta)$

(c) $\sin\left(\theta \pm \frac{\pi}{2}\right) = \pm\cos(\theta)$

(d) $\cos\left(\theta \pm \frac{\pi}{2}\right) = \pm\sin(\theta)$.

2. Explain why the function $f(\theta) = \sin(\theta)$, defined for all real numbers θ, *doesn't* have an inverse function, but the function $g(\theta) = \sin(\theta)$, defined only for $-\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}$, *does* have an inverse function.

3. How would you compute the inverse of $\sin(\theta)$ for any value of θ?

4. Using the previous two exercises we found a way to compute the inverse of $\sin(\theta)$ for any value of θ. Can you do the same for $\cos(\theta)$? How about $\tan(\theta) = \frac{\sin(\theta)}{\cos(\theta)}$?

5. Let $f(\theta) = \sin(\theta)$. Write down a function $m(a)$ describing the slope of the secant line between the points $(0, f(0))$ and $(a, f(a))$. (Hint: your answer may be a function of θ and a.)