Homework 10

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3 June 2024

Problem 1.2: Sarah can bicycle a loop around the north part of Lake Washington in 2 hours and 40 minutes. If she could increase her average speed by 1 km/hr, it would reduce her time around the loop by 6 minutes. How many kilometers long is the loop?

Solution: 2 hours and 40 minutes is equivalent to $\frac{8}{3}$ hours. We can let her current average speed by y. We can let the length of the loop be x kilometers. Because distance is equal to speed times time, we can say that

$$x = \frac{8}{3}y$$

We know that if we increase her speed by 1, her time decreases by 6 minutes, or $\frac{1}{10}$ of an hour. Thus, we can say

$$x = (y+1)\left(\frac{8}{3} - \frac{1}{10}\right)$$

Setting these two equations equal to each other, we get

$$\frac{8}{3}y = (y+1)\left(\frac{8}{3} - \frac{1}{10}\right)$$

Solving for y, we get $y = \frac{77}{3}$. We can substitute this value of y into our first equation to find x. Doing this, we get

$$x = \frac{8}{3} \cdot \frac{77}{3} = \frac{616}{9}$$

Thus, the loop is $\boxed{\frac{616}{9} \text{ kilometers}}$ in length.

Winter Homework 4 Additional Problemset Question 1: Solve the equation

$$2^{3x-6} = 8^{4-x^2}$$

We know tht $2^3 = 8$, so we can rewrite this as

$$2^{3x-6} = \left(2^3\right)^{4-x^2}$$

This is equivalent to

$$2^{3x-6} = 2^{12-3x^2}$$

Two exponentials that have the same base must also have the same power in order to be equivalent. Thus, we can say that $3x-6$ and $12-3x^2$ must be equal, or $3x-6 = 12-3x^2$. Solving for x in this equation using the quadratic formula, we get $\boxed{x = 2 \text{ and } x = -3.}$

Question 1: How do you think you've improved in math this year?

Answer: I think I have improved in math by gaining confidence in my ability to solve problems that I have never seen before, working in groups, and overall test-taking skills. Prior to this year, I had never worked with problems that were completely new to me, worked in group projects for math (or done a math project at all), and had low confidence in my ability to score well on tests because I would lose points on small details (like not boxing answers). This year I tried a lot of things that were outside of my comfort zone in math which pushed me to be able to do math completely differently from how I approached math previously, and gave me a lot of fulfillment when doing the math. Despite my confidence gain, I think I also improved by humbling myself in math this year. Before TS, I almost never had to study for a math test (and didn't in TS up until spring quarter). I improved a lot in spring quarter after getting one upsetting score on a quiz, as I started teaching myself how to actually study for tests where the material is completely new to me.

Question 2: How do you think you could still improve in math, going forward?

Answer: I can continue to improve in the areas of group work and study skills. Something almost always went wrong in group dynamics during group math projects, so I think I can work on overall group work skills when it comes to math. Interestingly, these issues with group work didn't come up in group projects for other classes, so I may have to work on group work in math specifically. Also, I still have a long way to go in building good study habits. I didn't study very much for math tests up until midway through spring quarter, so I need to try out different study habits and strategies that will give me the best success rate on tests. So far, my study strategies have been working, but I can still try out different ones.

Question 3: If you could send a message back in time and tell yourself one thing (relating to TS math) on the first day of Fall quarter, what would it be?

Answer: If I could go back in time, I would tell myself that I really don't know everything that TS math is going to teach me. I came in at the beginning of the year having skimmed the entirety of the Collingwood textbook and having a basic understanding of all the math topics that were going to be taught this year. I thought that the math material was going to be the extent of the class, similar to Algebra 2, but I was very wrong about that. In reality, the math wasn't actually the most important thing I learned in TS math this year and the syllabus is kind of misleading about that. I learned things that were very different from what I thought I was going to learn, like dealing with uncomfortable problems, people I don't like, scary questions, a new coding language, and how to write 5-10 page projects.

Question 4: How do you think TS math could improve for next year?

Answer: TS math next year does not need two math homeworks per week in fall quarter or the weekly discussion posts. I also hope that next year office hours are more accessible when they are in high demand. Fall quarter was definitely rough and was much harder than winter and spring quarters because we had two homeworks per week. I think I could've gotten the same learning with less stress if the assignments were once a week. Also, the discussion boards did not add much to my learning of the concepts that were being taught. Instead, I think we can replace the discussion boards with a question board. Everyone could ask questions about things the concepts they were confused about and other students could help them out (maybe requiring everyone to ask and answer at least one question per week).