Mathematics ia topics

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Non Sereeyothin

Math Period 3

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Gold Medal Heights

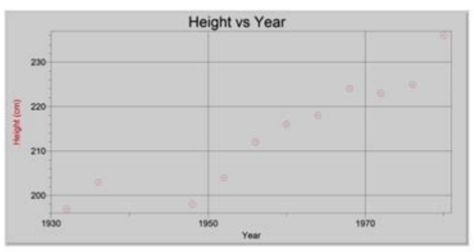
Objective: to consider the winning height for the men's high jump in the Olympic Games.

The table below gives the height (in centimeter) achieved by the gold medalists at various Olympic Games.

Year	1932	1936	1948	1952	1956	1960	1964	1968	1972	1976	1980
Height (cm)	197	203	198	204	212	216	218	224	223	225	236

Note: The Olympic Games were not held in 1940 and 1944.

Task 1: Using technology, plot the data points on a graph. Define all variables used and state any parameters clearly. Discuss any possible constraints of the task.



Graph 1: This graph shows the correlation between the year and the height of the gold medal winners in the Olympic. The x-axis on this graph presents the years that the data was collect while the y-axis presents the height of the gold winner of that current year. This graph was graphed using logger pro.

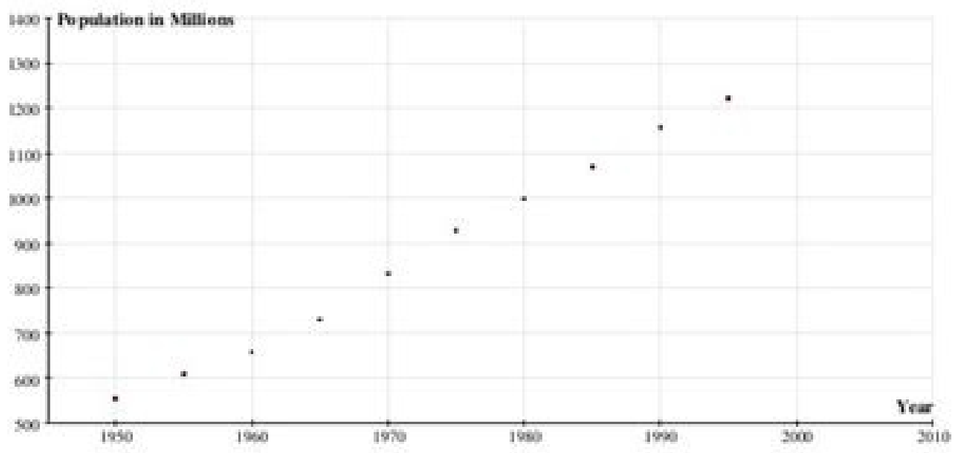
Constraints: During the years 1940 and 1944, the Olympic was cancelled due to the world war. Due to this, the data point does not continue according to its intervals of 4 years. It can be assumed that the

Population Trends in China are common to observe since China has the largest population on Earth since a number of years. We can observe its growth with the data collected from 1950 to 1995.

The variable for this data is the growing populations. The data collected is not completely accuratethough since a lot of parameters influence this data in many ways. The health of the people in China affects the data. The new medicine and technology discovered throughout the years affected a lot the conditions of living in many countries such as China. The migration of the people throughout the world also affects the set of data evidently. During this period of time there were a lot of geographical and natural disasters that affected the population of China by killing many in an unexpected situation. China is also a particular country because it set a one child policy in the country; this is a factor that affected a lot the growth of the population.

Year	1950	1955	1960	1965	1970	1975	1980	1985	1990	1995
Populations in Millions	554.8	609.0	657.5	729.2	830.7	927.8	998.9	1070.0	1155.3	1220.5

Here is a chart with the data and a graph showing its growth throughout the years. The X is the years in which the data was collected, the variable Y is the population that varies:



This is a clear graph obtained using Autograph by plotting in the data.

We can see on this graph that the population is constantly increasing. However we can also identify a small part of a curve which could by identified as an exponential function from the year 1950 up to the year 1975. A quadratic or sine curve could be used to fit this data. The points following that year however follow a simple linear function. So the data could fit a simple linear function. I tried a linear function to see how well it could fit.

1.3 Finding the Inverse of a Matrix

Defn 9 *Inverse of a matrix:* multiplicative inverse

If there is a matrix A then A^{-1} is the inve

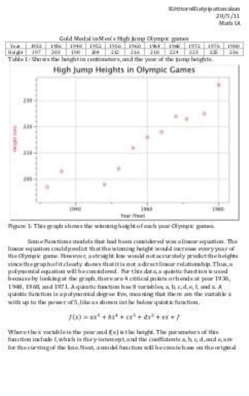
Ex 17 *Show that* $\begin{bmatrix} 7 & 5 \\ 4 & 3 \end{bmatrix}$ *and* $\begin{bmatrix} 3 & -5 \\ -4 & 7 \end{bmatrix}$ *are inverses.*

$$AB = \begin{bmatrix} 7 & 5 \\ 4 & 3 \end{bmatrix}\begin{bmatrix} 3 & -5 \\ -4 & 7 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$BA = \begin{bmatrix} 3 & -5 \\ -4 & 7 \end{bmatrix}$$

Finding the inverse of a 2×2 matrix

1. Interchange the elements of the diagonal.
2. Change the sign of the other 2 elements



Kitimat Stikine Regional School
2019/11
Math SA

Gold Medal in Men's High Jump Olympic games

Year	1932	1936	1948	1952	1956	1960	1964	1968	1972	1976	1980
Height	197	203	198	204	212	216	218	224	223	235	236

Table 1: Shows the height in centimeters, and the year of the jump heights.

Figure 1: This graph shows the winning height of each year Olympic games.

Some Pawnbroker models that had been considered was a linear equation. The linear equation could predict that the winning height would increase every year of the Olympic game. However, a straight line would not accurately predict the heights since the graph of it clearly shows that it is not a direct linear relationship. Thus, a polynomial equation will be considered. For this data, a quintic function is used because by looking at the graph, there are 4 critical points or bends at year 1936, 1948, 1968, and 1972. A quintic function has 6 variables, a, b, c, d, e, f, and x. A quintic function is a polynomial degree five, meaning that the x on the variable x with up to the power of 5, like as shown on the below quintic function.

$$f(x) = ax^5 + bx^4 + cx^3 + dx^2 + ex + f$$

Where the x variable is the year and f(x) it the height. The parameters of this function include f, which is the y-intercept, and the coefficients a, b, c, d, and e, are for the curving of the line. Next, a model function will be made base on the original

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Your Internal Assessment (IA) is a project that you will have to complete in all your IB classes. The style and grade value depends on the subject. It is a project that you will work on with the guidance of your teacher (or your tutor). The great thing about the internal assessment is that it allows students to be flexible and to further research a topic that they find interesting within the given subject. As good as it sounds, generating IA topic ideas is not always easy and that's why we decided to help you here with some unique math IA ideas. Just read on! What makes a good Math IA A good IA should demonstrate your own interest of the topic. Moreover, it should show that the student has learned and has been able to apply what they have learned. A good IA does not have to be a very complex and intricate piece of work. Rather a clearly stated and clearly answered research question, consistent structure, and clear personal engagement which demonstrates knowledge will earn the student a good grade. So let's jump into what you are here for. Here is a list of 25 possible topics that serve as great math IA ideas. And keep in mind that in a math IA, it is more important to pick a topic that genuinely motivates you to display personal engagement than to pick something that sounds harder but does not resonate with you. 25 Unique Math IA Ideas Arc lengths from integration techniquesArchitecture and mathematics: the golden ratioBertrand paradox and probabilitiesCat's cradle and the mathematics of knotsChaos theory and the logistic mapChess and the eight Queens puzzleConditional probability and the Monty Hall problemDescribing the vibrations of drums with Bessel functionsDirac delta function and its applicationsElliptical geometry: when the sum of the angles of a triangle does not equal 180ºEuler's identity: complex numbers and mathematical beautyFourier transformationsFractals in natureMarkov chains and random walksModular arithmetic: when 2+2 is not always equal to 4Möbius strip: the strange world of non-orientable surfacesSimpson's paradox and the strange outcomes of misused statisticsSpecial functions: error function and normal distributionsSurprising ways of finding Pi: Gaussian integral and the Leibniz FormulaThe Koch snowflake: fractals and the tessellation of planeThe Mandelbrot Set: when fractals meet complex numbersThe Logistic function and its applications (population growth, neural networks, or linguistics)The Gambler's ruin: how beneficial chances are never beneficial in the endThe wave equation: how differential equations can be used to find the shape of a music note.Topology: when a coffee mug and a donut are one and the same To think about before you choose Mathematics can be applied to pretty much all areas of human activity. For instance, a wave equation can be used not only to study music, but the dynamics of fluids and quantum mechanics as well, while the logistic function is applied to fields as diverse as population studies, neural networks, and linguistics. So remember to first pick an area that interests you, because the odds that one of the mathematics IA ideas above can be applied there are definitely in your favor. Still Struggling? No worries, our tutors are here to help. Whether you would like to consult what topic to choose or need additional help with setting up the structure of your IA, Think Smart Tutoring can help you. Just sing-up here for our tutoring services and we'll contact you shortly to set-up the first introductory session. Our students at For You Education have been asking how to tackle this daunting task; our mission is to assist students and relieve their stress in the IB environment. We have collected and summarized 5 tips from our professional tutors on how to come up with a mathematics IA topic.1. Talk to your teacherYour teacher is likely the best person to give you advice on what kind of topic would be suitable for your Math IA. Your teachers have a clear understanding of your individual strengths and weaknesses; and also have a clear understanding of what the IB Program wants from you.2. Do some researchBefore settling on a topic, it's important to do some research to make sure that it's something you're interested in and that there is enough material available for you to write a comprehensive essay. Try searching online or in the library for books and articles on your chosen topic. You can also look at past Math IA to see what other students have done, not only this would inspire you but also give you an understanding of what is required for you.3. Choose a topic that you're passionate aboutYour Math IA is an opportunity to explore a mathematical concept that you find fascinating. Pick a topic that you're passionate about, as you will have more of an understanding on how to apply mathematical concepts towards your chosen topic. For example, if you're interested in Statistics, we can recommend topics such as 'An investigation into the relationship between height and weight' or 'A study of the effects of different types of music on memory recall'. Alternatively, if you're interested in Geometry, we can recommend topics such as 'The relationship between the angle of incidence and the angle of refraction', or 'A study of the shapes formed by intersecting lines'.4. Make sure your topic is feasibleWhen choosing a topic, it's important to make sure that it's something you can actually write about. There's no use picking a subject that's too difficult or that you don't have enough information on. Do some research to make sure your topic is feasible, this will make your IA less stressful for you.5. Get help from a professional tutorIf you're struggling to come up with a good topic for your Math IA, or if you need help with any other part of the assignment, consider getting in touch with a professional tutor. At For You Education, our tutors are experienced in helping students with their IB Mathematics Internal Assessments and can provide valuable guidance and support. Not only that, our tutors who have 9 years of professional experience can give you more efficient ways of data analysis, collection and also better resources that will assist on your math AI journey."Hesitating?" That's okay, you can try a lesson for free! Hey guys can anyone feed me any ideas for my IB math exploration? It needs to be quite a high level mathematical research project, all ideas are welcome! Also something quite interesting...because i don't have the best attention span. Heya! I personally got a 17/20 (just hit that 7 benchmark!) for my math exploration (though a 6 in math HL as paper 1 pulled all my marks down pwhahaha so you might want to find someone who actually got a 7 in Math HL to help you out). I still remember I had a difficult time thinking of a topic to research about for my math exploration but then I went on google (it's your 2nd bestfriend) and just typed 'cool/interesting/fun math topics' and some of the topics gave me inspiration Check out these: wtg10/mathsindex.html (sometimes yahoo-answers provide you with some good ideas as well you might want to research more in depth in regards to the research area provided) Etc. Just go on google or yahoo or any search bars and just find something interesting that you're genuinely interested in (and know that you won't struggle in doing the maths in when you're writing up your IA) and just go for it Good luck with everything! (Original post by anniechan514) Heya! 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What was your IA actually on though? (Original post by IntBac) haha thanks and i would be more than happy if i got a 6! What was your IA actually on though? Mine was about the toroidal universe, the different shapes of it + exploring the rates of change of it (Original post by anniechan514) Mine was about the toroidal universe, the different shapes of it + exploring the rates of change of it oh cool, so it was really calc based? :P how much of it was in the syllabus? or you had to learn a lot of new stuff..? Nahh most of it was syllabus based, but do use some equations that are 'out of the syllabus' (Original post by anniechan514) Nahh most of it was syllabus based, but do use some equations that are 'out of the syllabus' Urgh i still don't know where to start...I'm looking at fractals atm, but i just don't know where the math will come from or how to approach it.. Hello! I started working on my maths IA as well. I was very interested by ur topic (Toroidal Universe) could you please email me ur IA? I was thinking on working on Lotka Volterra Equations for Population Model. Any suggestions? Ideas? Advices? Please Help! (Original post by chiragh) Hello! I started working on my maths IA as well. I was very interested by ur topic (Toroidal Universe) could you please email me ur IA? I was thinking on working on Lotka Volterra Equations for Population Model. Any suggestions? Ideas? Advices? Please Help! Hey no need to worry, its just an exploration not a full on research paper. As long as you put work into it you can get a good grade. After all, anything you can think of probably has been done 10 thousand times. No need to stress, its an exploration not a full on research paper so as long as you put work into it they don't care too much about your topic choice. After all anything you can think of probably has been done 5 thousand times. (Original post by IntBac) Hey guys can anyone feed me any ideas for my IB math exploration? It needs to be quite a high level mathematical research project, all ideas are welcome! Also something quite interesting...because i don't have the best attention span. I got 20/20 on mine. It was about how to calculate the length of a road. It turned out to be an application of polynomial regression and arc length. To score highly, find a problem and find the most mathematical way to solve a problem. Connecting concepts from different topics is also appreciated. Thats a really clever idea How did you go through the process? Find a curved road on google earth, copy it Then scale it on geogebra and take note of the coordinates. Now you find the function of best fit. And then calculate the length of the function from point a to b. In order to find a function of best fit, look for polynomial regression. You use partial differentiation, matrices, and some statistics Then to find the length of a function, use arc length. This requires basic calculus knowledge. That was pretty much it. Hope it helps (Original post by tenorblizzard) Find a curved road on google earth, copy it Then scale it on geogebra and take note of the coordinates. Now you find the function of best fit. And then calculate the length of the function from point a to b. In order to find a function of best fit, look for polynomial regression. You use partial differentiation, matrices, and some statistics Then to find the length of a function, use arc length. This requires basic calculus knowledge. That was pretty much it. Hope it helps Is there anyway you could post your paper online or email it to me? I haven't been able to find a perfect math exploration online and I think seeing one would really help me get an idea of what the IB is looking for. 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Sorry but until I get my results in January, I would wanna keep it personal. I can definitely help you with your IA, tho! just send me your facebook link or whatever through personal messages and we can talk on facebook. Still, I think that polynomial curve fitting is really easy to understand and it is just at the level of a math ia. there are many different applications of it and I think you should try to find one! This is the only source that taught me polynomial curve fitting, but im sure that your high school library has some books on statistics. pmvs/courses/...rvefitting.pdf So fractals seems to be where im heading, have you guys got any suggestions as to what I should be exploring and any paticular ideas. Either the maths is too complicated or not to my level hmm can you explain the step of using geogebra after copying the curved road in google map. I am not doing it for IA but I would like to know what you have to click in order to get the graph in geogegra hi i am doing something similar to finding the length of a road in that i am finding the arc length of a function. where i am stuck is finding the integral of something like sqrt(p(x)) where p(x) is a polynomial of degree 2+. did you have to do this too? hi i am doing something similar to yours in that I am finding the arc length of a function. The place where i am stuck is using the arc length formula, which you probably know for a polynomial function. When use the formula i have to integrate a polynomial of degree 2+ which i do not know how to do.

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