



City of Brockton

BROCKTON PUBLIC SCHOOLS

Basan Nembirkow ♦ Superintendent of Schools

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June 22, 2010

Dear Student/Parent,

The attached Math Packet is intended for students taking an Honors or CPA Calculus Class in the fall. The packet contains problems emphasizing necessary skills for the student beginning this course. While completion of these problems is optional, it is important to note that if you complete this packet successfully you will be eligible for up to 5 points extra credit on your term I average.

You may seek help on the problems. It is hoped that you will do whatever is necessary to complete all of the problems successfully. You must submit the answer sheet (which details the problems that must be done) and your work on separate sheets of paper. The answer sheet and work should be stapled together and submitted to your teacher on or before Tuesday, September 7, 2010. If you are in a second semester math class please return the completed packet to the Green Math Office by September 7, 2010. Late packets will not be accepted.

The following book references can be used to find information to help you complete these problems. You may also access any other sites or other means of help.

Go to www.Math.glencoe.com and use the appropriate user name and password.

Algebra I user name: ALG1 password: wRec84ehed

Geometry user name: GEO password: v7tr2SwAgU

Algebra II user name: ALG2 password: N4c6abrada

Advanced Math (Pre-Calculus) user name: AMC password Zaye9uB7ze

Good luck in completing this work. Remember while it is optional, it is an opportunity for all students to take a step in improving their term I grade and to review some important math skills at the same time.

Thanks,

Bob Perkins

Brockton High School ♦ 470 Forest Avenue ♦ Brockton, Massachusetts 02301-5633

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CALCULUS SUMMER ASSIGNMENT

I. Graph the following functions on your calculator one at a time:

1. $y = x$

4. $y = \sin x$

7. $y = \sec x$

10. $y = |x|$

2. $y = x^2$

5. $y = \cos x$

8. $y = \csc x$

11. $y = 1/x^2$

3. $y = x^3$

6. $y = \tan x$

9. $y = 1/x$

When you graph:

1. State the domain and range of each of the functions using interval notation.
2. List the roots of each function.
3. Discuss the asymptotic behavior of each graph.
4. Graph the following pairs of functions simultaneously and find their points of intersection using the capabilities of your graphing calculator.

a. 3 and 4

b. 5 and 10

II. Graph $y = \left(1 + \frac{1}{x}\right)^x$ on your calculator. Use the **table** function and state the value of y that

the calculator gives you for $x = 10, x = 10^0, x = 10^{-1}, x = 10^{-2}, x = 10^{-3}, x = 10^{-6}$.

Does y seem to be approaching some value as x gets smaller? Repeat this procedure for $x = 10^2, x = 10^3, x = 10^4, x = 10^5, x = 10^8$. What value does y seem to be approaching as x gets larger?

III. Address the situations presented on the following pages. These questions are being presented in a business proposal format, please respond to these inquiries appropriately. (How do you think a business would like to receive this information?)

If you have any questions, feel free to contact Mr. Corbett by email at daniel_corbett@yahoo.com.

Growing Mature Arboreal Trees
Oak Grove Avenue
Pinneapolis, PU 22222
June 18, 2007

Calculus Student
Brockton High School
440 Forest Avenue
Brockton, MA 02301

Dear Calculus Student:

I am desperate for help, and am in agony because I think no one but you can save me from this horrible mess. Indeed, it may be that even you can not save me; that I am entirely done for; but I'm pleading with you in spite of it all. Please, please help me. I don't know where else to turn.

The trouble all began, although I didn't know it then, about five years ago when my company hired Jack Phaze. Jack was a real toady, always sucking up to the company owner, Mabel Sabbling, and sneering at the rest of us. It wasn't long before most of us called him "Jerk Face" behind his back; you never met a guy less willing to do an honest day's work, or more willing to take credit for work done by others.

It wasn't too long either before Jack surprised us by getting promoted into a position of importance. I guess I should back up and explain what our company does. The "Growing Mature Arboreal Trees" Company (or as it is popularly known, "GMA Tree") cultivates exotic trees for use in bird sanctuaries and movie sets. As you can imagine, there's very little demand for this kind of thing, so we have a small business with few competitors. If I lose this job where I've worked all my life, there's not anywhere else I can go. I know exotic trees; that's all!

About a year ago, Jack finally was promoted to working directly beneath me, to my great chagrin. The morale of all the people in my group went down, absenteeism went up, and I'm sure it was all because of how miserable it is to work with Jack. One day I actually pulled aside a group of my employees to ask them what was bothering them, and they confirmed my suspicions: Jack never did what he was supposed to, and everyone else ended up covering for him just to get the projects done. Then, after they'd covered his rear end, he'd sneer at them for how hard they worked. I was very angry, as you could imagine, and I told them, "If I have anything to do with it, Jerk Face is out of here."

Wouldn't you know it, right at that moment he walked around the corner; I could tell he'd heard me by the look on his face. We've been out for each other's blood ever since.

I had a harder time getting rid of him than you might imagine. It turns out that Phaze has an uncle in the bird sanctuary business (clearly the secret of his longevity in our company).

Well, shortly after the "Jerk Face" incident, I had a visit from an herbicide specialist that Mabel Sabbling (the company owner) wanted me to talk with. Edgar (I don't remember his last name, but I wish I did!) convinced me that we could build a greenhouse which protected trees from insects and disease. He showed me a bunch of figures, enough to convince me to commit our company to eventually purchase such a greenhouse. Then, just two days after I signed the contract, he told me he's been hired by a bird sanctuary and was being sent to Costa Rica. I haven't been able to get his forwarding address from his new company, so I can no longer ask for his help. I smell Jack behind all this!

Here's the problem. Our company can only commit \$4225 to this project without going into debt. Also, since the greenhouse can only hold so many trees, we need to make sure that we're spending no more than \$100 per tree; otherwise we'll operate at a loss. Ed assured me this was possible; he even showed me how to do it; but he took most of his notes with him, and I'm no mathematical genius.

Here's how the expenses add up. First, to build a greenhouse, you need \$2,222 just in start up costs. Then, for each tree in the green house, you need \$5 for a proper planter. But in addition, because the more trees there are, the easier it is to spread infection, the cost of disinfecting any one tree is \$1 for each tree in the greenhouse.

The one example Edgar did that I managed to save goes like this: suppose we plant 10 trees. Then we'd spend \$2222 for the greenhouse, plus \$50 for planters, plus \$10 to disinfect each of 10 trees (meaning \$100 for disinfecting the whole greenhouse). The total cost would be \$2,372, which works for us. But unfortunately this comes to over \$237 per tree; that's bad.

I tried figuring out what happens if we increase the number of trees, say to 100. In that case, I got the cost per tree to be a better (but still not acceptable) \$127, but the total cost to be an exorbitant \$12,722. I'm not even sure these figures are right, however. I'm sure you could tell me.

I showed these figures to Sabbling, and she threw a fit; swore I'm going to wreck the company. She gave me three weeks to come up with a way to make this work, or I will be out of a job. I just know Jack is licking his lips over all this, waiting to take my place.

Can you help me figure out what to do? I'm sure that Ed was sincere, just as sure I am that Jack is a duplicitous, two-faced, no good scoundrel. I have until September 22 to get on track with Sabbling (that's when the contract I signed says we have to place our order with the company).

Yours most sincerely,

George Bush
Associate Vice President for DisInfection

Fire Swamps and Rodents and Snakes (Oh, My)

11 Patinkin Way
First National Park of Guilder
June 18, 2007

Advanced Calculus Student
Brockton High Schools
440 Forest Avenue
Brockton, MA 02301

Dear Calculus Student:

Things have finally quieted down around Guilder since Prince Humperdinck was kicked out of Florin. The good news is that I've managed to find a government job as the head of the First National Park of Guilder. The bad news is that most of the Park consists of the Fire Swamp. The worse news is that the only other employee at the Park is Fezzik. Don't get me wrong. I love the giant like a brother, but he can be a little frustrating to work with. When I went looking for help with our long range planning, your enterprising and resourceful professor naturally referred me to you.

We have two species that have me really worried about the future of the Park: the indigenous ROUS (rodents of unusual size) and the brown tree snake which entered Guilder about 50 years ago as a stowaway from Guam on the ship of the Dread Pirate Roberts . Fortunately, ROUS's eat brown tree snakes. Unfortunately, brown tree snakes reproduce very rapidly.

My predecessor at the Park was a meticulous census taker (who used statistical sampling, by the way, to get more accurate counts), so I have approximate populations for each species for the last 30 years.

| Year | Tree Snakes | ROUS's |
|------|-------------|--------|
| 1968 | 15300 | 415 |
| 1970 | 9890 | 910 |
| 1972 | 2860 | 950 |
| 1974 | 3340 | 525 |
| 1976 | 9340 | 250 |
| 1978 | 12290 | 460 |
| 1980 | 9050 | 830 |
| 1982 | 4840 | 855 |
| 1984 | 5130 | 545 |
| 1986 | 8720 | 340 |

| | | |
|------|-------|-----|
| 1988 | 10490 | 500 |
| 1990 | 8550 | 770 |
| 1992 | 6030 | 790 |
| 1994 | 6200 | 560 |
| 1996 | 8350 | 410 |
| 1998 | 9410 | 525 |

It looks like the populations are following some sort of pattern, but I'm not sure what it is. My real problem is that when either population gets very large, I will need additional employees to make sure that both species stay within the park and don't escape in the Guilder farmland. This is where I need your expert help (which your enterprising and resourceful professor assures me you can deliver). Specifically, I need a prediction for what the populations will be in each of the next 20 years.

In addition, I believe the populations are fluctuating less and less, and may eventually stabilize. I would like your expert opinion on whether or not the populations do stabilize, and if they do, I need to know how long it will take and what the eventual populations will be.

Once the populations stop fluctuating so drastically, we will be able to dramatically improve access to the Park by offering summer camps, establishing permanent camp grounds, and perhaps even adding a logride, although there are still some flame-retardant issues to be worked out. This should all be possible when the ROUS population is fluctuating by less than 75 per year and the brown tree snake population is fluctuating by less than 500 per year. As usual, I need your expert recommendation on when this will occur.

I have a meeting with the Budget Advisory Committee at the end of the month to propose our budget for the next two decades, so I would greatly appreciate your report by September 23.

Gratefully yours,
Inigo Montoya

A Few Notes from Your Enterprising and Resourceful Professor

To see the general trend of the populations, I would suggest plotting the points for each population separately, with time on the horizontal axis and population on the vertical axis. It may make things a little bit easier if you let time $t=0$ be 1968.