when a bactericide was added to a nutrient broth in which bacteria were growing, the bacterium pop continued to grow, but then stopped and began to decline. the size of the pop at the time t (hours) was: \( b = 10^8 + 10^4t - 10^3t^2 \)

find the growth rate

\( t = 0 \) hours

that is.

So would you know how to start this problem?

Do I take the derivative?

Is that what my first step would do with all these work problems?

Yeah

Er... Most of the time, you take the derivative, but there are some cases in which it differs. It helps to understand what you’re doing for these problems. For this one, you’re looking for the growth rate. Since it has the word rate in it, that should signify that you need to take the derivative. After doing more of these problems, you’ll eventually be able to figure out when you do need to take the derivative. But since you just started learning about derivative and rates recently, then it’s expected that the problems will have it so you need to take the derivative first.

Anyway, what did you get for the derivative of the equation?

Ummm, would it be \(-20^3 + 40^4t^3\)

Wait one sec

Ok.

Is the t inside of the exponent, or is it being multiplied by the tens? I mean is it \(10^4t^3\) or \(10^4t\)?

its ten to the forth t so the second one you wrote.

Ok.

How did you get \(40^4\) then?

It was help to expand the exponents then.

\( 10000t - 1000t^2 \)

I see.

Would it be \(-20^3 + 10^4\)

Once you expand the exponents, you don’t need to look at the original problem. Actually wait, yeah you’re right.

So how do I let the peo expand the t given?

Ah wait, \(20^3\) gives us 8000, which isn’t what we should be getting.

Cause when we take the derivative of \(1000t^2\), we should be getting 2000t.

Sorry, did I lose you?

So how would the derivative be? I’m confused on how to treat the \(10^3t^2\) would I bring the 2 to the front?

Yes, that’s all you need to do, ah okay.

But you can’t just multiply the \(10^3\) by 2, since that goes against the order of operations.

So is its \(2^3 \cdot 10^3 t - 10^4\)? Right, sorry, would the neg go to the to or 10?

Signs are reversed. First should be negative and second should be positive.

Negative goes to the 2, positive goes to the ten.

\(-2^3 \cdot 10^3 t - 10^4\), the expanded form works.

We could also write this as \(-2000t + 10000\). Which ever one works better for you.

So now we’ve taken the derivative and we need to find the growth rate at \(t = 6\). \(t = 5\).

This is pretty similar to the other problems we’ve gone over.

so just set the ts equal to each of those?

Yes.

Okay great.

These problems are a lot more intimidating than they are difficult. I just get stuck on where to start.
what's R²

R square value is when you display the trendline and equation, you will also select the R square value.

The R square value tells you how the two variable correlated to each other.

The highest R square is 1.0 while the lowest is 0.0

A flat line has a R² value of 0.0 because there is no relationship at all.

Well, you can actually click on the white board and begin typing, instead of using the box below.

Yeah, sure. That could be one of the explanation. 0.9997. Highly correlated.

The fact that R² equaled to 0.9997 showed that the trend line and the equation were very reliable? Is not reliable. The R² tells you how "related" the two variables are.

Like "comparing teenagers spending time on TV vs. their grades"

If I have a high R² value, then that means that spending time on TV and grades are highly correlated. But it does not mean that they have a direct influence. "CORRELATED" if you talk R².

So just write highly related, and that’s it? If you talk about the trendline, then you can say absorbance and concentration are directly proportional related.

The absorbance increases when the copper concentration increases. <= Now, that my friend, seventh 2 pts.

Conclusion is just mostly rephrase your results again in words.

Were you given the true unknown concentration?

no

that’s why I’m going to ask him tomorrow, hopefully in the morning

He will be there I believe. But I know you guys were not provided the unknown concentrations.

okay, thanks^ see you tomorrow

No problem
So you understand how negative exponents work?

Yeah

Not exactly

Remember that \((xy)^{-1}\) is its own term and \(x\) and \(y\) are also other terms.

Yeah

Seems like it's right.

Yes

You would only be able to do that if there was an \((xy)^{-1}\) at the bottom, which there isn't.

Oh I see

What about the \(y\) and the \(x\) can that become \(xy\)?

It would actually help to separate this one fraction into two different fractions.

So that it is easier to see what can cancel out.

Mmm do I distribute the \(y\) into \((xy)^{-1}\) then the same for the other side.

Yes, that's another way you can do it.

Almost, now just simplify those two fractions into four fractions so that

you can begin canceling out

Almost

Ok

Actually, before we continue, does this problem have an answer in the back?

Oh

Yes \((xy)^{-1}\) \((xy)^{-1}\)

\(xy\)

So we were actually pretty close to simplifying this problem completely. Just ignore the previous step.

\((xy)^{-1}\)

Ok, so you're factoring out at \((xy)^{-1}\) from both terms.

For the \((xy)^{-1}\), what would be left after factoring?

The \(y\)

And what about the \((xy)^{-1}\)?

The \(x\)

Right, so you're left with both \(y\) and \(x\).

And what's the sign between the two terms?

Try writing the numerator then.

Sure. Online tutoring ends at around 9 though.

Yes, just remember to put the \(x\) and \(y\) in parenthesis.

Omg, I see it now. Duh

Alright, good job.

I think I am just making it so much harder.

Ok no prob thanks so much. I appreciate it!!

Then it really is.

No problem.

Have a good evening.

Yeah, most people seem to do that.

It's usually a lot easier than it seems a lot of the time.

So, is there anything else that you need help on?

Well now that I got some understanding, I will try to do it on my own and if I need help can I come back?