Rising Calculus Students –
Summer Work

- Solve part I in June, part II in July, part III in August.

- **The idea of the review is to do little work** (each of these 3 packets should take about 3 hours of work), **but spread in time** so it refreshes your memory every now and then and keeps alive the knowledge you acquired during the year. Of course, you can do everything in August, but by then your memory will be stale beyond the rejuvenating power of this packet. Or you can do it all now, but by late August, when classes begin, you will have trouble to retrieve this knowledge from the dungeons of your memory. If you want to invest your time poorly, go ahead.

- You are expected to solve all of the problems responsibly and show your work in its entirety. **Don't use the graphing features of your calculator to solve the problems** unless asked to do so. However, if you solved a problem and the solution can be checked using your calculator, by all means do it. Moreover, consider the checking-with-your-calculator thing part of the problem.

- And, if you solved the problem but your calculator seems to have a different opinion about the solution, **ask for hints**. Or if your solution should be Florida and you got Alaska, in that case too, **ask for hints**: write to me at rvilarrubi@barrie.org. Be explicit about what you did, what you got, and/or what you find puzzling. A couple of sentences. You may include a scan in your email. Help may delay a day or two.

- Work hard at resolving discrepancies. Not so hard that it mars your vacation (intelligence includes having a sense of proportion).

- Turn in the packet with your solutions the first day of classes. It will be a conversation piece the first week of class, and part of your first quarter grade.

- Enjoy your vacation!

June Review

1. Find the equation of a line using a point on it and its slope. Use point-slope. Don't simplify!

1a. Find the equation of the line with slope -2 through the point (1, 5)

1b. Find the equation of the line with slope 0.5 through the point (-2, 4)

2. The Shanghai radio tower is 632 meters tall. Suppose a worker working at the top drops a screwdriver

2a. Find a rule that expresses the height of the screwdriver in meters t seconds after it was dropped.

2b. Trying to prevent the fall of the screwdriver, the worker dropped a wrench that started falling two seconds after the screwdriver. Write a rule for the height of the wrench in meters t seconds *after the screwdriver was dropped.*

2c. How many seconds after the screwdriver was dropped will the wrench hit the ground? Set up an equation and solve it

3. Solve the equation $(x^2 - x - 2)(x + 7) = 0$

4. Reduce to a single exponential

4a. $\frac{e^5 \cdot e}{e^2} =$

4b. $\frac{1}{e^4}(e^3)^5$

5. Solve the equation $(e^x - 8)(e^x + 1)e^x = 0$

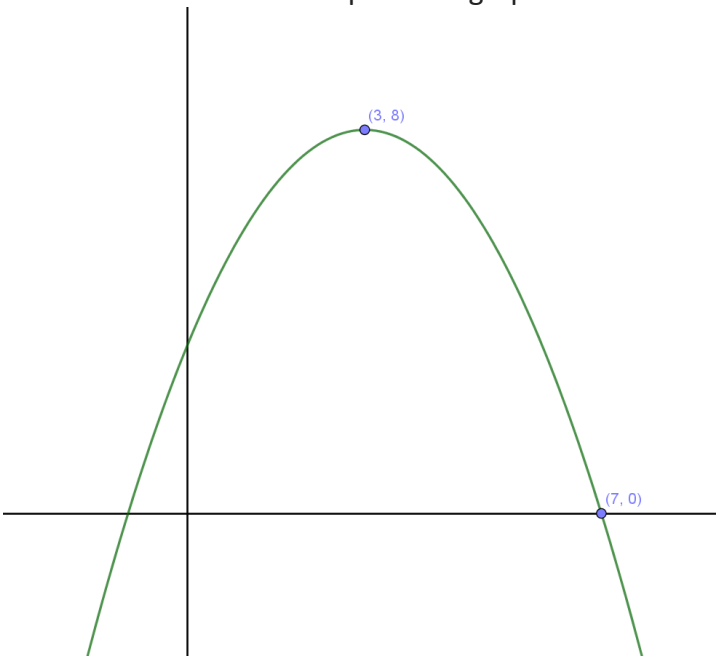
6. Use the last-in-first-out approach to solve the equation (i.e. do not expand the square)

$3(x-5)^2 - 11 = 37$

Review – July

1. The students of a school in Indianapolis are raising funds and are planning to sell t-shirts with the school logo. They have polled the student and concluded that if they charge $6 they will sell 170 tees and, every time they add $1 to the price, they would lose 10 sales. Find a rule that expresses the number of tees they expect to sell as a function of the price they charge for them.

2a. Find a rule for the quadratic graph below



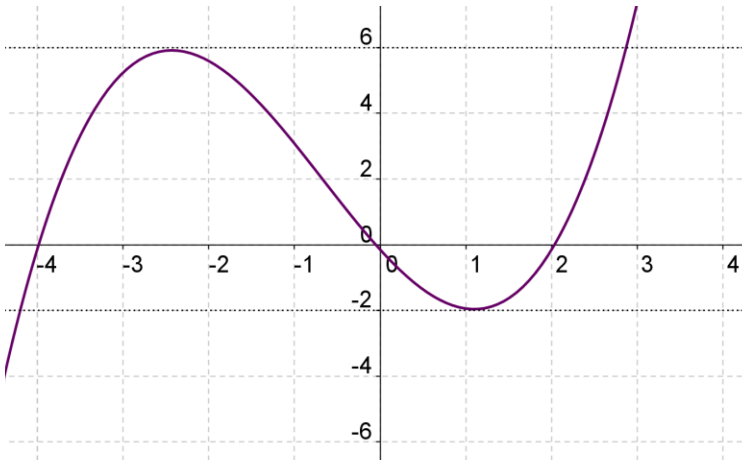
2b. What is the second x-intercept?

3. Solve the equation

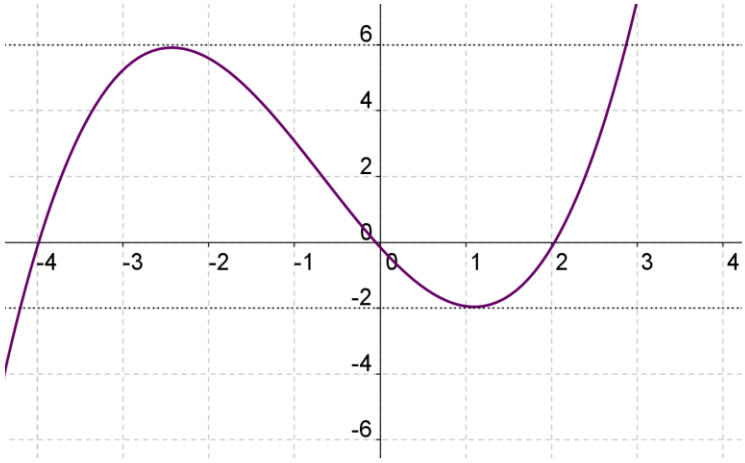
$$(x - 4)^2 + x = (2x - 1)(3 - x) + 3$$

4. Below you will find several copies of the graph of the function $f(x)$. In each case, use the same grid to sketch *tidily and as accurately as possible* the graph of the indicated function

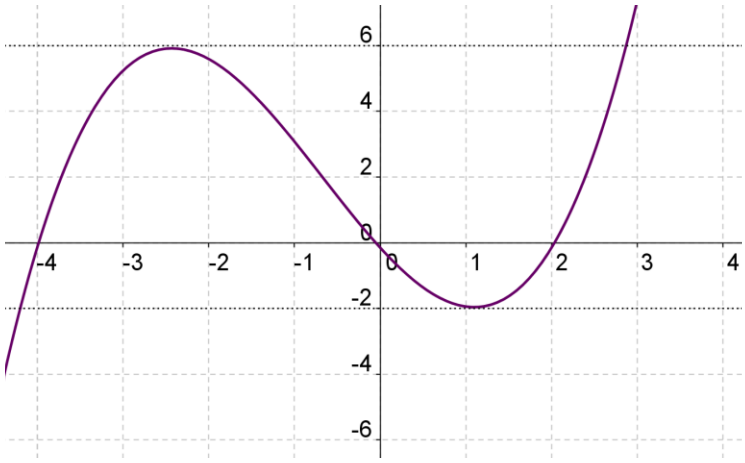
4a. Graph $|f(x)|$



4b. Graph $g(x) = f(-x)$



4c. Graph $g(x) = f(x - 1)$



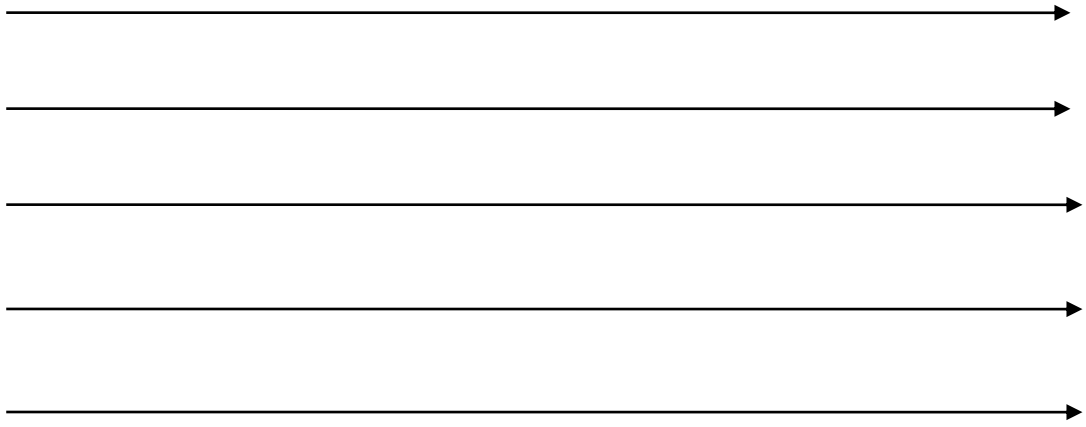
5. Reduce each of the following to one single logarithm

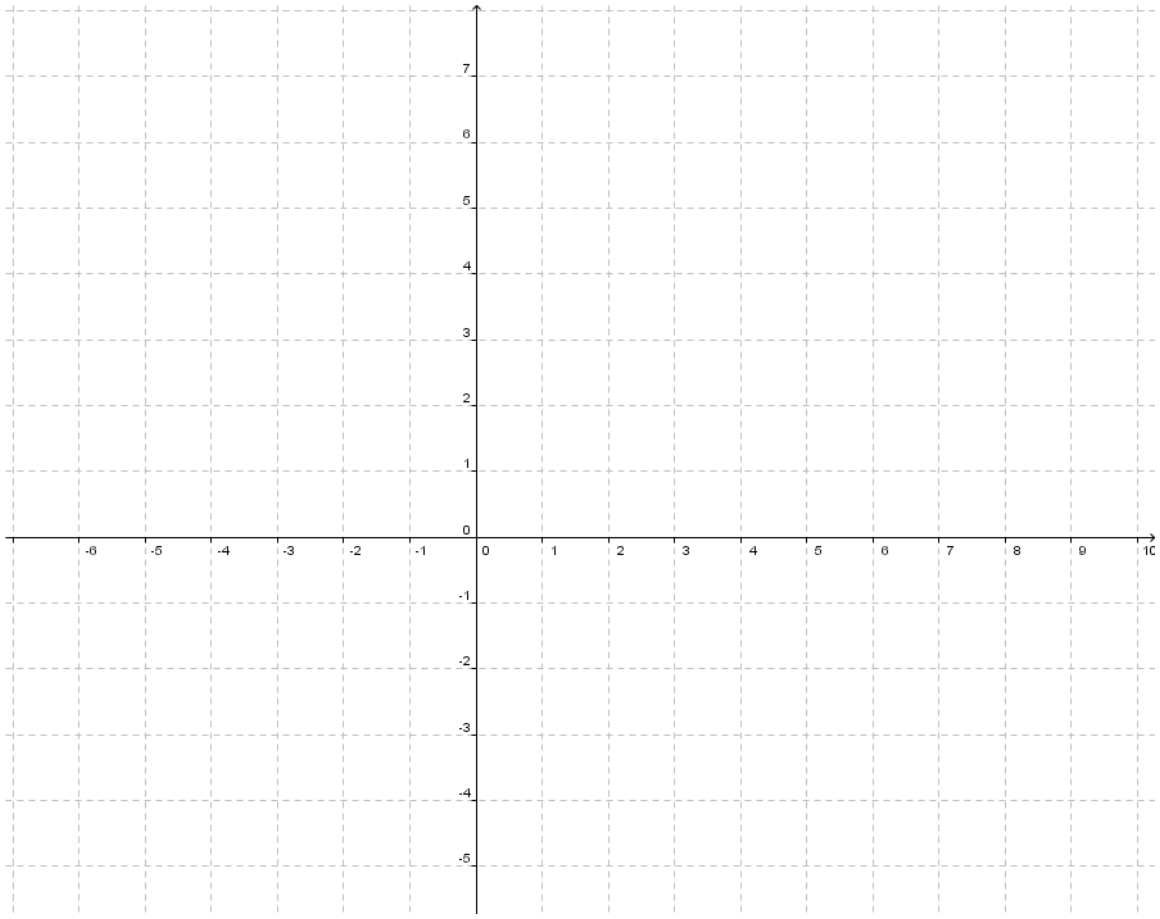
5a. $\ln x + \ln(x - 1) =$

5b. $3\ln x + \ln(x + 5) =$

5c. $\ln(x - 3) - 2\ln x =$

6. Make a sign diagram for the function $f(x) = \dfrac{x^2 - 4x + 3}{(x+2)^2(x-6)}$ and graph it using the grid on the next page. Find, plot and label all intercepts and vertical asymptotes, and analyze the long term behavior of the function




7
6
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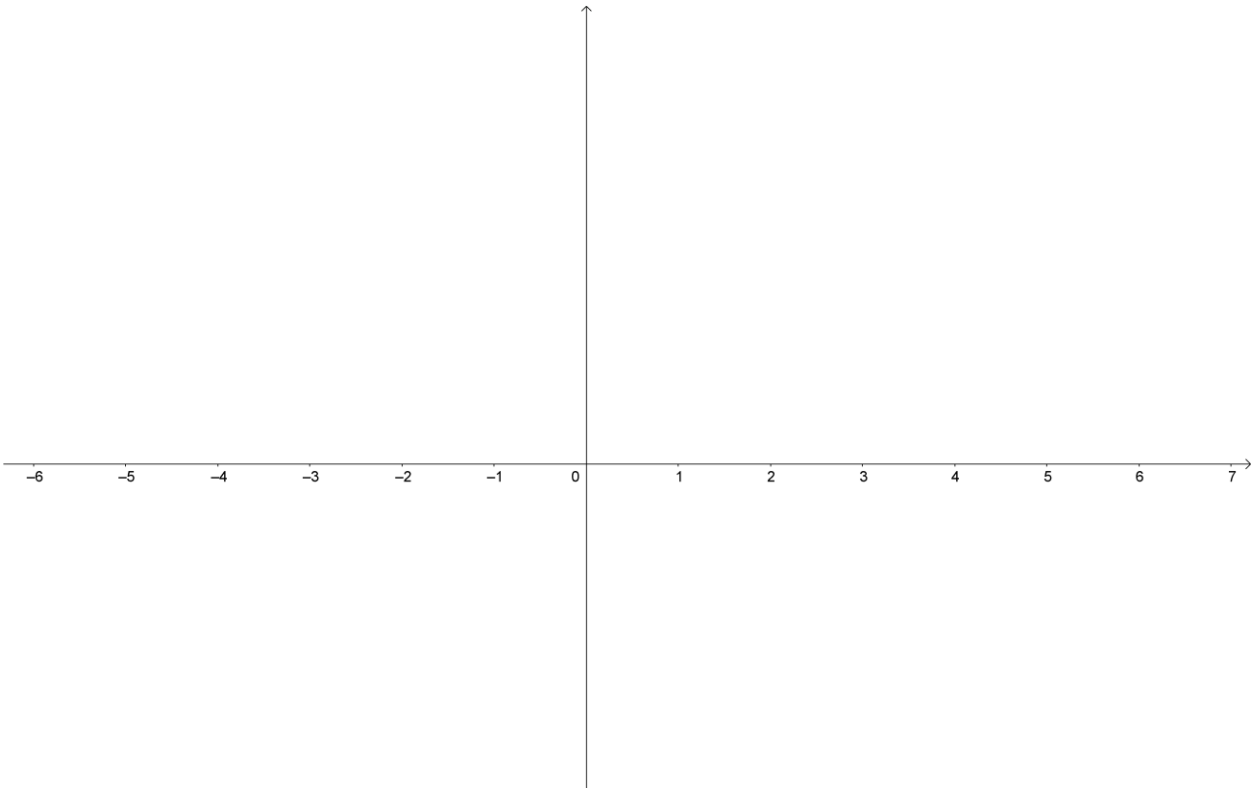
6. Graph the function $f(x) = e^{-x} - 4$. Your graph should include x- and y-intercepts as well as any asymptotes (use a ruler!)



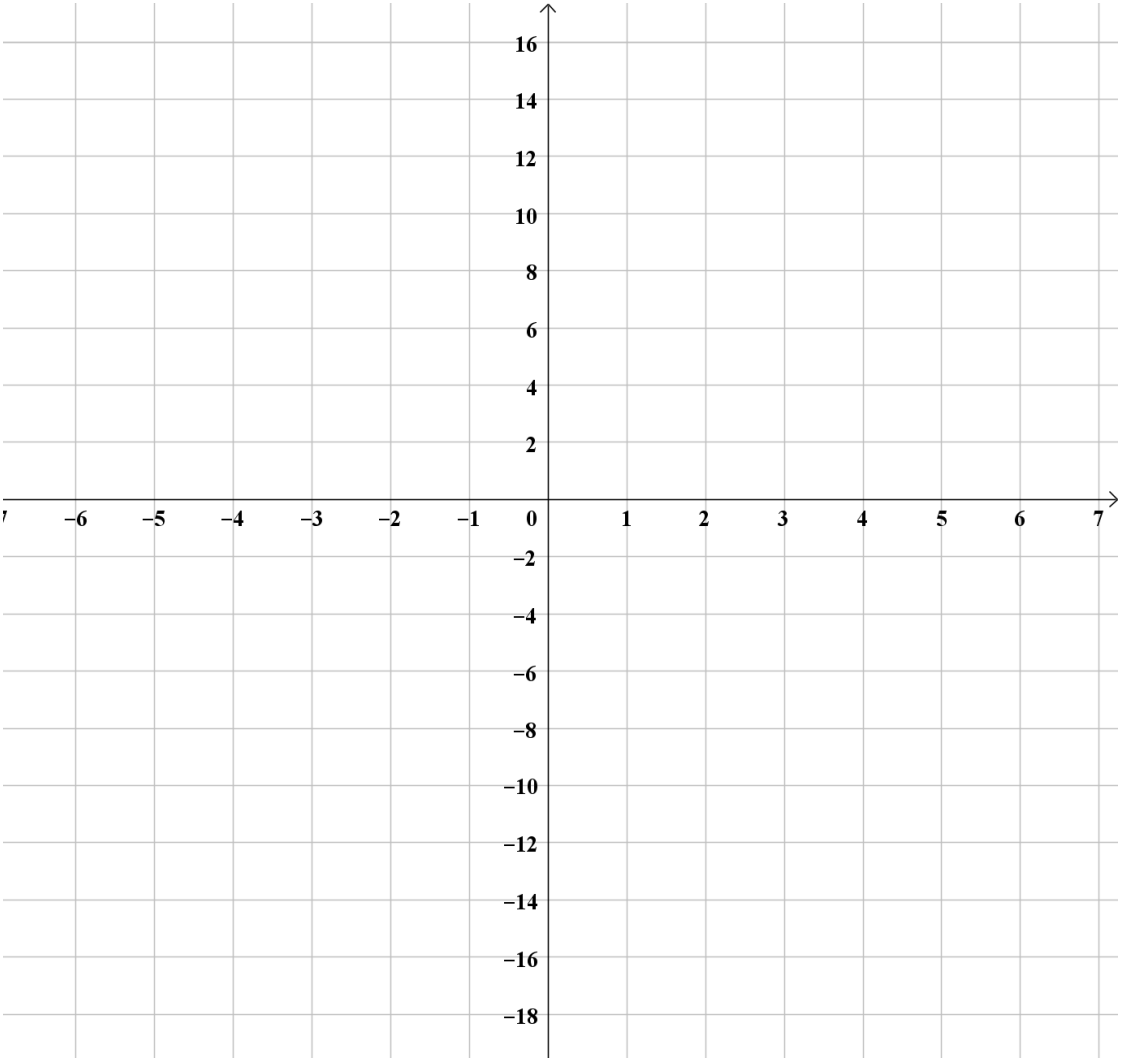
7. Find the domain of the following functions (the values of the independent variable for which they make sense)

7a. $f(x) = \ln\left[\frac{x-3}{x}\right]$

7b. $g(x) = \sqrt{\frac{2x-4}{3x+1} - 3}$

Review -August

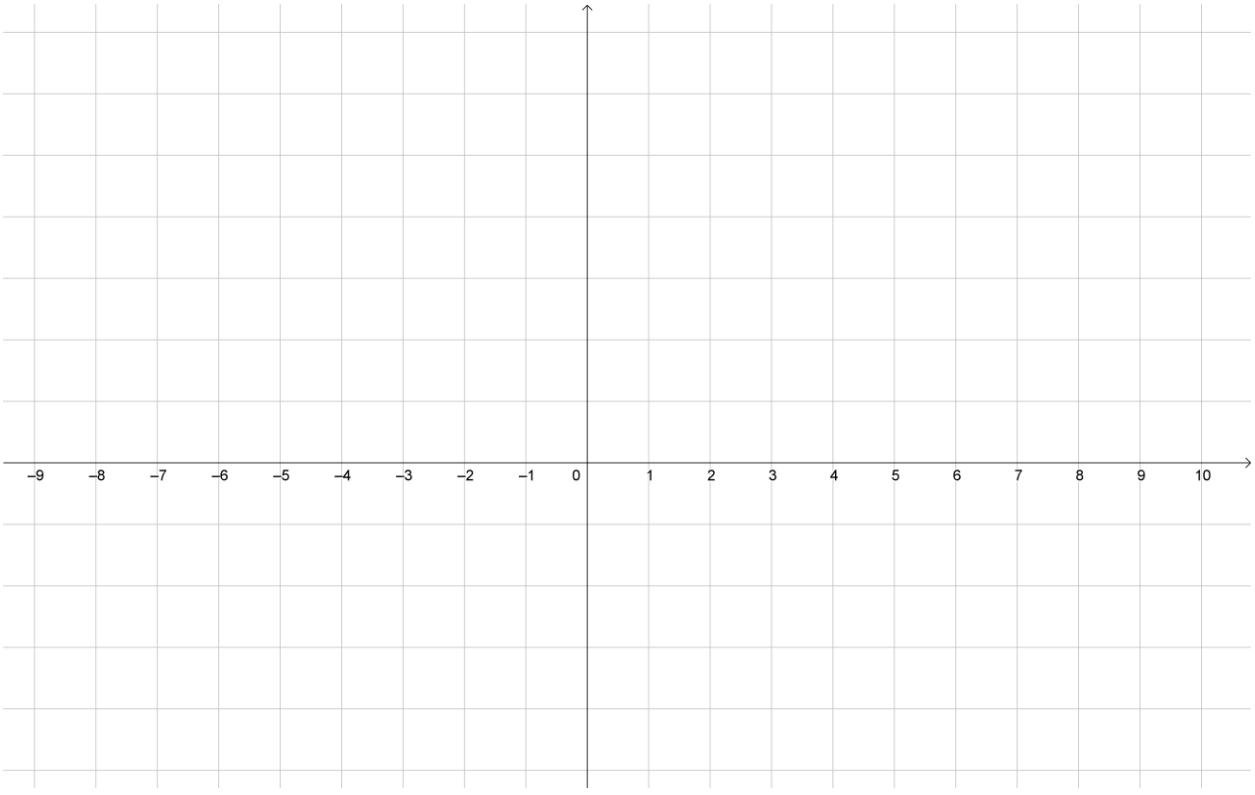
1. Sketch the graph of $f(x) = x^2 - 2x - 15$. Your graph should include all intercepts and vertex



2. Solve the equation $\ln(x^2 - 3) = 0$

3. Use the graphing features of your calculator and CALC to find all the intersection points of the graphs of the functions $f(x) = 5e^{x^2}$ and $g(x) = \frac{1}{x} + 1$

4. Graph the function $f(t) = \dfrac{(3t^2 + 4)(t - 5)}{(t^3 - 9t)}$ your graph should include all x- and y-intercepts and all vertical and horizontal asymptotes.



5. Find the following values of ln without the aid of technology. Show your work.

5a. $\ln \sqrt{e} =$

5b. $\ln \sqrt[3]{e^2} =$

5c. $\ln \frac{1}{e^3} =$

5d. $\ln \frac{e\sqrt{e}}{e^4} =$