

Sample Exam 3
Math 19, Fall 2009

Note that you should not think of the topic coverage from this exam as exhaustive; the exam is supplied just to give you an idea of style of question. The emphasis of your exam is likely to be quite different than the emphasis of this sample exam, as there is plenty of material that we have covered this semester that was not covered by this sample exam (like sections 5.1–5.2), and vice versa. Note also that several questions have been cut, so the exam is much shorter than yours will be. In general, your best guides to what will be covered by this exam are the homework and the list of review topics.

1. Write the expression $\log \left[\frac{2x^3 \sqrt[3]{x-5}}{(x+11)^7} \right]$ ($x > 5$) as a sum and/or difference of logarithms, expressing powers as factors. Show all your work.

2. Solve $4^x = 13^{1-x}$. Show all your work, and leave your final answer in exact form.

3. The temperature $f(t)$ of a certain object at time t , in degrees Fahrenheit, is given by

$$f(t) = 75 - 15e^{-t}.$$

(a) Draw the graph of $f(t)$ using transformations. Start with the graph of $y = e^{-t}$ and show all your steps.

(b) Is the object getting hotter or cooler? Briefly **explain**, using the graph of $f(t)$.

4. Let $R(x) = -3 \frac{(x+1)}{(x-30)(x+20)} = \frac{-3x-3}{x^2-10x-600}$. When indicated, make sure you put your answer in the appropriate box. Show all your work.

(a) Find the y -intercept of $R(x)$ and the real zeros of $R(x)$.

(b) Find all vertical asymptotes of $R(x)$.

(c) Find all horizontal asymptotes of $R(x)$.

(d) Find the x values where $R(x) > 0$ and the x values where $R(x) < 0$. Show all your work.

(e) Sketch the graph of $R(x)$. Make sure that all of the above information is clearly visible in your graph. (It is more important that the key features are visible than for your graph to be drawn to scale.)

5. Let $f(x) = -2 + \ln x$.

(a) Find the x -intercept(s) of the graph $y = f(x)$. Show all your work, and leave your final answer in exact form.

(b) Find the asymptote(s) of the graph $y = f(x)$, and draw the graph $y = f(x)$. Make sure you label all intercepts and asymptotes on the graph.