

Most weeks will be structured like this week. There are three free response questions, similar to the structure of the free response portion of the AP Exam. Each problem is worth nine points. For final grading of the POW, refer to the POW rules on the website.

NOTE: Problem #1 should be answered on the first page, #2 on the back of the first page, and #3 on the front of a second piece of paper. Last week's solutions and this page should serve as your cover sheet. You will turn in four pre-stapled pieces of paper in all this week.

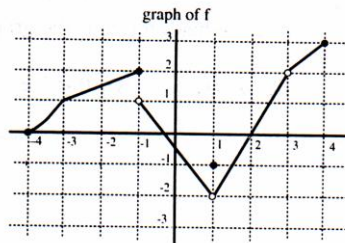
1. (*calculator required*) Consider the graph of $f(x) = 5 + \ln x - \frac{14}{\ln x}$.

- Using interval notation, state the domain of this function.
- Find the zero(s) of this function, rounding your answer(s) to three decimal places.
- Which of the following best describes the graph of $f(x)$?
 - increasing and concave up
 - increasing and concave down
 - decreasing and concave up
 - decreasing and concave down
- If $f'(x) = \frac{1}{x} + \frac{14}{x(\ln x)^2}$, state the range of $f'(x)$.
- Which of the following best describes the graph of $f'(x)$?
 - increasing and concave up
 - increasing and concave down
 - decreasing and concave up
 - decreasing and concave down

2. (*calculator required*) Consider the function $g(x) = \begin{cases} (x-1)^2 & x < 2 \\ 2x-3 & x > 2 \end{cases}$

- State the domain of the function.
- Find the value of $g(6) - g(3)$.
- Compute the x-intercept of $g(x)$.
- Compute the y-intercept of $g(x)$.
- Sketch a graph of the function on the x-interval $[0, 4]$.

3. (*no calculator*). Consider the graph below:



- State the domain of f . Write your answer using interval notation.
- Compute $f(-3) + f(-1) + f(1)$
- For what interval(s) is f decreasing? Write your answer using interval notation.
- For what value(s) of x $f(x) = 1$?
- What is the maximum value of f ?