

Calculators cannot be used for this exam. In all problems you must show your work. In all problems your answers must be clearly labeled. If the grader has to guess which answer goes with which part of the problem then you will not receive credit. If the grader has to guess which part of what you wrote is actually the answer then you will not receive credit. When possible put a box around your answer and clearly label it. All work must be written in the exam booklet. Put your name, your TA's name, your discussion time, and your UIN on the exam booklet. *Do not write in the upper right corner of the booklet*, this is used to write your scores. You can keep the exam sheet but you must turn in the exam booklet. Only what is in the booklet will be graded. If no work then no credit.

1. Use algebra to find all solutions to $|1 - x| < 5$. Show all steps and box your answer.
2. Find all solutions to $\frac{4}{|x-1|} < 1$. Show all steps and box your answer.
3. Solve for t when P is ten times A :

$$P = \frac{A}{1 - B \cdot 2^{-rt}}$$

Show all steps and box your answer.

4. Given that $1 + i$ is a root of $f(x) = x^4 - 2x^3 + 3x^2 - 2x + 2$, find all remaining roots (real and complex). Hint: use long division and the fact that complex roots occur in conjugate pairs.
5. Find all solutions to:

$$e^{\ln(2) \cdot (x-5)} + \ln(1) \cdot 10^{(x^2+1)} = 2^{-6/x} \cdot \ln(e) + \frac{\log_3(10)}{\log_3(e)} - \ln(10)$$

Hint, if you use the properties of logarithms, the expression reduces to one that is easy to solve.

6. Consider the rational function $f(x) = \frac{4(1-x)}{1+x}$:
 - (a) Find all x-intercepts
 - (b) Find all y-intercepts
 - (c) Determine the end behavior of $f(x)$ i.e.
 - as $x \rightarrow \infty$, $f(x) \rightarrow ?$
 - as $x \rightarrow -\infty$, $f(x) \rightarrow ?$
 - (d) Using the above information, sketch a graph of $f(x)$ labeling all of the above on the graph. Use at least $1/2$ page for your graph.