

Math 1155, Fall 2009, Exam IV

Name:

Section:

Instructions: This is the third exam for Math 1155, Intensive Precalculus. You have 50 minutes to complete the test. Do not start until you are told to begin.

When you receive this booklet, count the pages to be sure that you have every page. There should be 8 pages, including this cover sheet. No notes or books are allowed on this exam. Scientific calculators are allowed, however, calculators with graphing capabilities may not be used. You should simplify all fractions and square roots when they appear in your answer. For decimal answers, round angles to at least 1 decimal place and other numbers to 3 significant figures.

I expect you to use notation correctly and may penalize you for failing to do so. In particular, an equal sign should appear between two things that are equal; an equal sign should not appear between two things that are not equal. For full credit on a problem you must show the final correct answer and give a reasonably neat and logical account of how you got that answer.

There are a total of 50 points, distributed among 9 problems. The problems are worth varying amounts. You must show your work for all problems. Little or no credit will be given for unsupported answers. Even if you can do the problems in your head, you must convince me that you know what you're doing. Good luck.

Problem	Points	Possible
1-5		20
6		8
7		10
8		6
9		6
Total		50

This is the multiple choice portion of the exam. Circle all answers that are correct. There will only be one correct answer to a question. No partial credit on these.

1. (4 points) Find the domain of

$$\ln \frac{x+1}{x-3}.$$

- (a) $(-\infty, -1] \cup (3, \infty)$
- (b) $(-1, 3)$
- (c) $[-1, 3)$
- (d) $(-\infty, -1) \cup (3, \infty)$
- (e) None of these

2. (4 points) Find the horizontal asymptote of $\frac{x^3-3x+71x-1}{5x^3+x-20}$.

- (a) $x = \frac{1}{5}$
- (b) $y = \frac{1}{5}$
- (c) $x = 5$
- (d) $y = 5$
- (e) None of these

3. (4 points) Find the vertical asymptote(s) of $\frac{x^2-5x+6}{(x+1)(x-10)(x-3)}$.

(a) $x = -1, x = 10, x = 3$

(b) $y = -1, y = 10, y = 3$

(c) $x = -1, x = 10$

(d) $y = 10$

(e) None of these

4. (4 points) Simplify $\log_3 7 \log_7 27$.

(a) 3

(b) 9

(c) $\ln 9$

(d) $\ln\left(\frac{7}{3}\right) \ln\left(\frac{27}{7}\right)$

(e) None of these

5. (4 points) Find all of the roots of $3x^3 + 7x^2 + 8x + 2$. (Hint: Proceed by elimination)

(a) $-3, -1+i, -1-i$

(b) $-\frac{1}{3}, -1+i, -1-2i$

(c) $\frac{1}{3}, -1+i, -1-i$

(d) $-\frac{1}{3}, -2, -1+i, -1-i$

(e) $-\frac{1}{3}, -1+i, -1-i$

6. (8 points) Polonium-210 is a radioactive substance, hence it decays over time. Assume that at time $t = 1$ day, we have 200 grams of polonium-210, and at time $t = 3$ days we have 132 grams. Let $A(t)$ be the amount of polonium-210 at time t .

a) Find $A(t)$. (If you can't think of anything better to do, let $A(t) = A_0 e^{\lambda t}$ and solve for λ and t .)

b) Determine the half-life of polonium-210. (That is, how long until only half of our initial amount remains.)

7. (10 points) You are looking to invest \$1000, and two banks have made nice offers. Bank A will give you 6% interest compounded annually and bank B will give you 5.5% interest compounded continuously. Which bank do you choose? (A lucky guess is worth nothing. We'll need to see a comparison of how much would be in each account after some time has elapsed.)

8. (6 points) Solve the equation $\ln(x + 4) + \ln(x + 2) = \ln 8$

9. (6 points) $2 + i$ is a root of $x^5 - 3x^4 + 2x^3 + 2x^2 + x + 5$. Find all of the other roots.