# MATH 1113/2804 Test III

## Spring 2007

Name: ______________________________
GTid (9xxxxxxxx): ______________________________
Instructor: Mitchel T. Keller
Course (1113/2804): ______________________________

- There are 11 questions on this exam on 4 pages (not counting this coverpage). **Write your name at the top of each page.**
- Answer each question in the space provided; if you need additional space, you may write on the back of the page, but clearly indicate by the appropriate problem that you have work on the back.
- Be sure to explain your answers, as answers that are not accompanied by explanations/work may receive no credit.
- You are to complete this exam completely alone, without the aid of notes, texts, calculators, cellular telephones, personal digital assistants, or any other mechanical or digital calculating device.

By signing on the line below, you agree to abide by the Georgia Tech Honor Code, the principles of which are embodied by the Challenge Statement:

*I commit to uphold the ideals of honor and integrity by refusing to betray the trust bestowed upon me as a member of the Georgia Tech community.*

Failure to sign this cover page will *not* be considered evidence of academic misconduct. However, **if the cover page is not signed, 5 points will be deducted from your raw total score on this exam.**

Student signature: ______________________________

| Question: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Points: | 10 | 8 | 6 | 16 | 6 | 10 | 6 | 6 | 8 | 10 | 14 | 100 |
| Score: | | | | | | | | | | | | |

1. (10 points) Find all zeroes of the polynomial function $h(x) = 2x^3 - x^2 - 2x + 1$.

2. (8 points) Given that the complex number $i = 0 + 1 \cdot i$ is a zero of $g(x) = x^3 + 2x^2 + x + 2$, find all zeroes of $g(x)$.

3. (6 points) Alice and Bob are discussing the the polynomial function

$$f(x) = 9x^5 + 12x^4 - 31x^3 + x^2 + 8x + 1.$$

They agree that 1 is a zero of $f$. (This is true. You do not need to verify it.) Bob says that this is the only positive real zero of $f$. Alice tells Bob that he's being silly and there is precisely one more positive real zero. Who's right? Why? [*Hint*: You can answer the question without working on actually finding roots.]

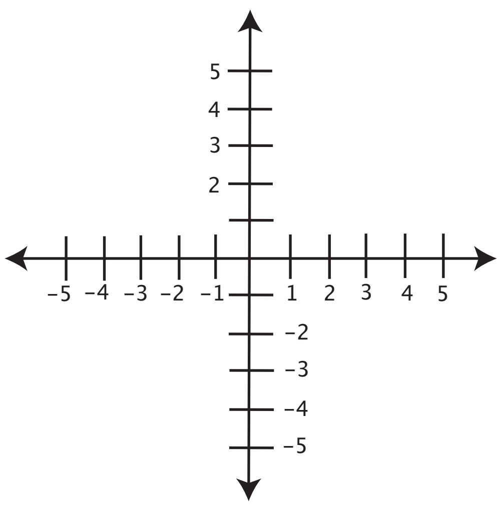
4. (16 points) Consider the function $f(x) = \dfrac{2x+4}{x+1}$.

   (a) State the domain of $f$.

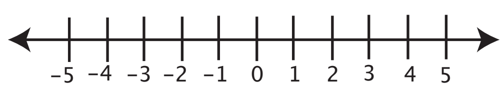
   (b) Identify all intercepts of $f$.

   (c) Find any vertical and horizontal asymptotes of $f$.

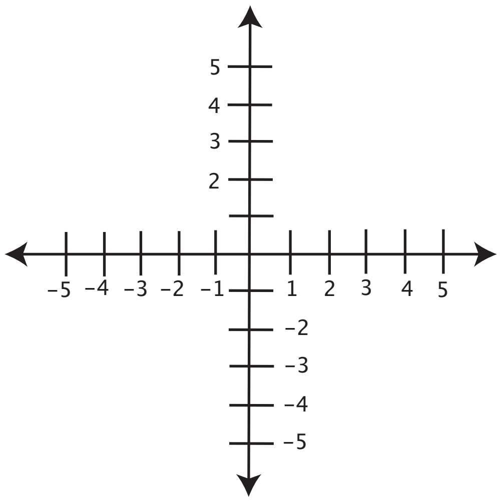
   (d) Plot additional solution points as needed to sketch the graph of $f$.




5. (6 points) Solve $x^2 - 4x \leq -3$ and show the solution set on the real number line.



6. (10 points) Describe the translations required to obtain the graph of $f(x) = e^{x-1} + 2$ from the graph of $g(x) = e^x$ and then sketch the graph of $f(x)$.




7. (6 points) Find the exact value of $\log_2 \sqrt{8} - 2^{\log_2 \frac{1}{2}}$ without using a calculator.

8. (6 points) Solve $e^{x-3} = e^{2x+2}$ for $x$.

9. (8 points) Expand the logarithmic expression

$$\log\left(\frac{zy^4}{x}\right)$$

assuming that all variables are positive.

 Points earned:______
out of a possible 30 points

10. (10 points) Solve for $x$ in $\log_5 x + \log_5(x-4) = 1$

11. (14 points) The number of bacteria $N$ in a culture is modeled by $N(t) = (100)(2^{kt})$ where $t$ is the time in hours and $k$ is a constant.

   (a) Given that $N(2) = 1600$, find $k$.

   (b) Use your value of $k$ from part (a) to determine how much time is required for the original population to double in size.

 Points earned:________
out of a possible 24 points