

Name \_\_\_\_\_ Student ID \_\_\_\_\_  
Instructor \_\_\_\_\_ Class time \_\_\_\_\_

### INSTRUCTIONS

1. Carefully mark your name and Student ID Number on your exam
2. This exam has 5 pages, including the cover sheet. There are 2 questions for a total of 45 points.
3. When you are finished, please check your work carefully. When you are finished, return the exam to your instructor.
4. Crying is allowed, but please do not get your tears on the exam. It will stain the ink.

This is a take home exam. You are allowed to use your class notes, textbook, office hours provided by Professor Doyle, your own personal calculator, and your fellow classmates for help. Anything else is strictly forbidden and will result in a 0 on the exam if proven to be used. By signing below, you agree that you have completed this exam fairly, using only the resources allowable to you by Professor Doyle.

Signature: \_\_\_\_\_

Try your best! You're going to do great! No matter what, I'm proud of you!

1. (20 points) Consider the function

$$3x^3(x-1)^2(x+3)$$

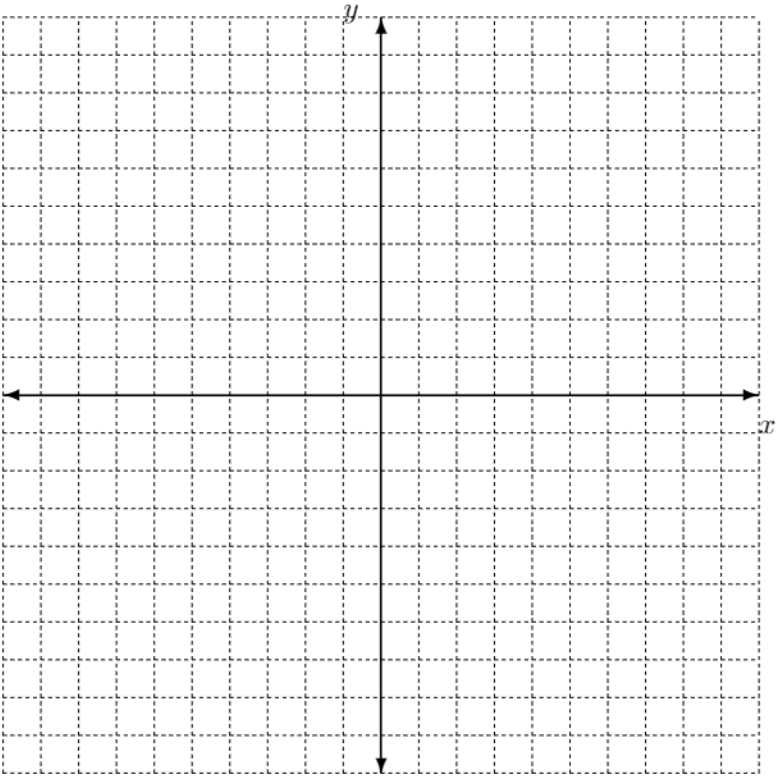
A) Use the Leading Coefficient Test to determine the graph's end behavior

B) Find the  $x$ -intercepts. State whether the graph crosses the  $x$ -axis, or touches the  $x$ -axis and turns around, at each intercept.

C) Find the  $y$ -intercept.

D) Determine whether the graph has  $y$ -axis symmetry, origin symmetry, or neither.

E) State the maximum number of turning points and sketch your masterpiece (graph on back).



2. (25 points) Consider the function

$$\frac{x^2}{x^2 + x - 6}$$

A) Determine whether the graph has symmetry.

B) Find the  $y$ -intercept (if there is one) by evaluating  $f(0)$ .

C) Find the  $x$ -intercepts (if there are any) by solving  $q(x) = 0$ .

D) Find any vertical asymptotes.

E) Find the horizontal asymptotes.

F) Find any more points to help you fill in your graph. Pick three.

G) Graph your masterpiece.

