

General Instructions: Write your name on only the outside of your blue book. Put your test paper inside your blue book as you leave. Solve each of the following problems. Point values (out of 100 points) are indicated on the problems.

1. Give the equation of the function,  $f(x)$ , that has the same shape as the given function,  $g(x)$ , but with the indicated transformation performed. Caution (b) and (c) are different (*10 points each*):

(a) The given function is  $g(x) = |x|$ ; the desired function,  $f(x)$ , is obtained by moving the graph of  $g(x)$  to the right 3 units and down 2 units.

(b) The given function is  $g(x) = x^2$ ; the desired function,  $f(x)$ , is obtained by moving the graph of  $g(x)$  up 2 units and reflecting the result in the  $x$ -axis.

(c) The given function is  $g(x) = x^2$ ; the desired function,  $f(x)$ , is obtained by reflecting the graph of  $g(x)$  in the  $x$ -axis, and moving the result up 2 units.

2. Solve the equation or inequality (*10 points each*):

(a)

$$\frac{x}{x-2} + \frac{2}{x} = \frac{1}{x^2 - 2x}$$

(b)

$$x(x+2) + (x+2) < 0$$

(c)

$$|2x - 3| < 11$$

(d)

$$25 < |x + 5|$$

3. Write the complex number in the form  $a + bi$  (*5 points each*):
- (a)  $i^{29}$
  - (b)  $(1 + i)^4$
4. Give a polynomial with real coefficients (in factored form) that has roots and degree indicated (*5 points each*):
- (a) Roots:  $1 + i$ , and  $2$ , degree =  $3$
  - (b) Roots:  $-2i$ ,  $2$ , and  $3$ , degree =  $4$
5. Compute the quotient and remainder using synthetic division (*10 points*):

$$(x^5 + 243)/(x + 3)$$