

## Conceptual Problems

*Please provide a short explanation for your answers in this section.*

**1. (3 points) True or False?** The function  $f(x) = |x| + 1$  has an inverse.

**2. (3 points) True or False?** If  $z_1$  and  $z_2$  are complex numbers, then  $\overline{z_1 + z_2} = \overline{z_1} + \overline{z_2}$ , where  $\overline{z}$  denotes the complex conjugate of the complex number  $z$ .

## Computational Problems

*Please show your work.*

**3. (4 points)** The function given by  $f(x) = k(2 - x - x^3)$  has an inverse function, and  $f^{-1}(3) = 2$ . Find the value of  $k$ .

4. (4 points) Write the product/quotient of the complex numbers in the form  $a + bi$  where  $a, b$  are real numbers.

a.  $(1 + i)(3 - 2i)$

b.  $\frac{3+i}{3-i}$

5. (4 points) Find the (possibly complex) roots of the polynomial  $f(x) = -2x^2 + 3x - 2$ .

**6. (4 points)** Find the solution sets of the following.

a.  $3|4x + 1| - 7 = 11$

b.  $|4x + 1| \geq 21$

c.  $|2x - 1| \leq -1.$

**7. (4 points)** Write the standard form of the equation of the parabola with vertex  $(-2, -2)$  and passes through  $(-1, 0)$ .

**9. (4 points)** Find an absolute value inequality with solution set  $[-5, 3]$ .

**10. (4 points)** Sketch the graph of the quadratic function  $f(x) = -x^2 - 2x + 1$ . Identify the vertex, axis of symmetry, and  $x$ -intercepts.