

## Math 206 - Homework #2

Due February 21, 2006

1. Determine all fourth roots of

$$\frac{-4(1-i)^2}{1+i}$$

2. Determine all fifth roots of

$$-a \times 32i$$

where  $a$  is a positive real number.

3. Show that the following limit does not exist:

$$\lim_{z \rightarrow 1} \frac{1-z}{1-\bar{z}}$$

4. Use definition of limit to prove that

$$\lim_{z \rightarrow z_0} z^2 = z_0^2$$

5. Show that the function defined as

$$f(z) = \begin{cases} 1 & , z = 0 \\ \frac{\sin z}{z} & , z \neq 0 \end{cases}$$

is continuous everywhere in the complex plane.

\*For a complex number  $z = x + iy$ ,  $\sin z = \sin x \cosh y + i \cos x \sinh y$