Homework 4, due Friday, February 21

Please turn in solutions for the following problems:

(1) Find each limit or explain why it does not exist:

(a) $\lim_{z \to -2i} \dfrac{z^3 - 8i}{z + 2i}$

(b) $\lim_{z \to 8+i} \dfrac{1}{1 - \mathrm{Im}(z)}$

(c) $\lim_{z \to \infty} \dfrac{4z^6 - 7z^3}{(z^2 - 4)^3}$

(d) $\lim_{z \to \infty} \dfrac{|z|}{z}$

(2) Use the rules for differentiation to find the derivative of each function.

(a) $f(z) = 3iz^4 + 2 - i$

(b) $f(z) = (i - 2z^2)^3$

(c) $f(z) = \dfrac{z+1}{z+i}$, where $z \neq i$

(3) Let $g(z) = \overline{z}$. Write in the form $g(x+iy) = u(x+iy)+iv(x+iy)$. Check the Cauchy-Riemann equations to determine if this function is differentiable.

In addition, I suggest that you work these problems from the Brown/Churchill textbook (but do not turn in):

- Pages 55-56, problems 3, 10
- Page 62, problem 1