Homework 6

MATH 420

Please email me your homework as a pdf file
All work must be shown clearly. You must justify all your answers.

1. Find the residue at $z = 0$ of the function
   (a) $\frac{1}{z+z^2}$ (b) $z\cos(1/z)$ (c) $\frac{z-\sin z}{z}$

2. Using the Residue Theorem evaluate the integral of each of the following functions around the circle $|z| = 3$ in the positive sense
   (a) $\frac{e^{-z}}{z^2}$ (b) $\frac{z^5}{1-z^3}$ (c) $\frac{z+1}{z^2-2z}$

3. Evaluate
$$\int_{-\infty}^{\infty} \frac{x^2}{x^4+16}\,\mathrm{d}x$$

4. Evaluate
$$\int_0^{2\pi} \frac{\mathrm{d}\theta}{5+4\sin\theta}$$