Math 417 Homework 11

Due November 27

1. Using contour integration, determine $\int_{-\infty}^{\infty} \frac{x^3 \sin 2x}{x^4+16}\, dx$.

2. Using contour integration, determine $\int_0^{2\pi} \frac{1}{4+3\cos\theta}\, d\theta$.

3. Problem 1, page 282 of Churchill and Brown.

4. Let $f(z) = \frac{1}{z} + \frac{1}{z-1} + 1$. Determine $\int_{|z|=\frac{3}{2}} \frac{f'(z)}{f(z)}\, dz$.

5. For any positive integer n, determine the number of solutions to the equation $5z^n = e^z$ lying inside the circle $|z| = 1$.

6. Show that $z^5 + 2z^2 + 3z + 2$ has five zeroes inside the circle $|z| = 2$, and determine the number of zeroes of $z^4 + 7z + 5$ that lie inside the circle $|z| = 1$.