Math 317: Complex Analysis
Assignment 6

Due November 28, 2014, by 12:00pm (noon) in Johnson 117A

1. $\displaystyle\int_0^\pi \frac{d\theta}{1 + \frac{1}{3}\cos\theta}$

2. $\displaystyle\int_0^{2\pi} \frac{\sin^2\theta}{5 - 4\cos\theta}\,d\theta$

3. $\displaystyle\int_{-\infty}^\infty \frac{dx}{(1 + x^2)^2}$

4. $\displaystyle\int_{-\infty}^\infty \frac{x}{(x^2 - 2x + 2)^2}\,dx$

5. $\displaystyle\int_{-\infty}^\infty \frac{\cos 2x}{(x^2 + 4)^2}\,dx$

6. $\displaystyle\int_{-\infty}^\infty \frac{\sin 2x}{x^2 + x + 1}\,dx$

7. Plot the images of the given regions under the mapping $w = z^2$.

    (a) $|z| \geq 5$

    (b) $0 < y < 1$

    (c) $\dfrac{\pi}{4} < \arg z < \dfrac{\pi}{2}$

8. Find and sketch the images of the angular region $0 \leq \arg z \leq \frac{\pi}{8}$ in the case of the mappings $w = iz, w = z^2, w = iz^2$ and $w = -z^2$.

9. Find the points in the z-plane at which the given mapping fail to be conformal.

    (a) $w = z^5 - 5z$

    (b) $w = e^{z^2}$

    (c) $w = \sin \pi z$