

Due Oct 15. No class on Oct 13.

1. Evaluate the following integrals using residues.

a)  $\int_0^{\frac{\pi}{2}} \frac{dx}{a+\sin^2 x}, |a| > 1$

b)  $\int_{-\infty}^{\infty} \frac{x^2-x+2}{x^4+10x^2+9} dx$

3)  $\int_0^{\infty} \frac{\log x}{1+x^2} dx$

2. How many roots does the equation

$$z^7 - 2z^5 + 6z^3 - z + 1 = 0$$

have in the disc  $|z| < 1$ ?

3. How many roots does the equation

$$z^4 - 6z + 3 = 0$$

have in the annulus  $1 < |z| < 2$ ?