# MA 2325
# Assignment 5
# Due 2 December 2009

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1. Let
$$f(z) = \frac{\exp(2\pi i \xi z)}{1+z^2}, \qquad g(z) = \frac{1}{1+z^3},$$
$$h(z) = \frac{\tan(z)}{z^2}, \quad k(z) = \frac{\sin(z)}{z}$$
Find all poles of $f$, $g$, $h$ and $k$.

2. With $f$, $g$, $h$ and $k$ as above, find the orders of all their poles.

3. With $f$, $g$, $h$ and $k$ as above, find the residues at each pole.

4. Draw the path
$$\gamma(t) = \frac{2\cos t}{1+\sin^2 t}(1 + i \sin t) \qquad 0 \le t \le 2\pi.$$
What are the winding numbers about the points $1$, $-1$, $i$, $-i$? You needn't lift any paths or compute any integrals, just use the picture you've drawn.