(1) Find the maximum of $|\cos z|$ on the square $0 \leq x \leq 2\pi, 0 \leq y \leq 2\pi$.

(2) Let $f$ be analytic on the open unit disk $D$. Assume $f(0) = 0$ and $|f(z)| \leq 1$ for $z \in D$. Show that in fact $|f(z)| \leq |z|$ on $D$. (Hint: Let $g(z) = f(z)/z$. Show $g(z)$ is analytic on $D$ and apply the maximum modulus theorem to $g$.) Show further that $|f'(0)| \leq 1$.

(3) Let $f(z) = (z - i)/(z + i)$. Compute the image under $f$ of the following figures:
   (a) The real line
   (b) The circle with center 0 and radius 2.
   (c) The circle with center 0 and radius 1.
   (d) The imaginary axis.

(4) Find fractional linear transformations mapping $z_j \mapsto w_j$ in the following cases:
   (a) $z_1 = -1; z_2 = 1; z_3 = 2; w_1 = 0; w_2 = -1; w_3 = -3$
   (b) $z_1 = -1; z_2 = 1; z_3 = 2; w_1 = -3; w_2 = -1; w_3 = 0$