

**Problem 1.** Let  $f(x) = x^2$ ,  $g(x) = x - 5$ , and  $h(x) = \frac{1}{x}$ .  
Write each of the functions below as a composition of  $f$ ,  $g$ , and  $h$ .

(a)  $\frac{1}{x^2 - 10x + 25}$ ;

(b)  $\frac{1}{x^2 - 5}$ ;

(c)  $\frac{1 - 5x^2}{x^2}$ ;

(d)  $\frac{1 - 10x + 25x^2}{x^2}$ .

**Problem 2.** We have seen that  $\cos(x - y) = \cos x \cos y + \sin x \sin y$ . Use this to compute  $\cos(\frac{\pi}{12})$ .

**Problem 3 (Extra Credit).** Define a function  $f : \mathbb{Z} \rightarrow \mathbb{R}$  by  $f(k) = \cos(\frac{2\pi k}{6})$ .  
Set  $E = \{k \in \mathbb{Z} \mid k = 2n \text{ for some } n \in \mathbb{Z}\}$ . Find  $f(E)$ .