Homework due Aug 25 - extra problems

1. It can be shown that

$$\int_0^\pi \cos^2(x)\,dx = \pi/2$$  \hspace{1cm} (1)

Use this fact to find

$$\int_0^{2\pi} \cos^2(x/2)\,dx$$  \hspace{1cm} (2)

2. Let

$$G(t) = \int_0^{1/t} \sin(\pi t^2 x^2)\,dx$$  \hspace{1cm} (3)

Show that $G(t) = c/t$ for some number $c$. (You don’t have to find $c$.)