# Math 250a (Fall '07) - Homework 2 extra problems

1. Let

$$f(t) = \int_0^t \sqrt{x} \, \cos(\frac{x^2}{t^2}) \, dx \tag{1}$$

Using a substitution, show that $f(t) = ct^p$ for some numbers $c$ and $p$. You should find $p$ explicitly and find a formula for $c$ that involves a definite integral.

2. Find the derivative with respect to $x$ of each of the following:

$$\int_0^x \ln(2 + z^2) \, dz \tag{2}$$

$$\int_{-1}^{e^x} \cos(\sqrt{\theta}) \, d\theta \tag{3}$$

$$\int_{\sqrt{x}}^{x^2} e^{-t^2} \, dt \tag{4}$$