

1. Compute the quadratic Taylor approximations for the following functions. a)  $f(x) = 1/x, a = 1$   
b)  $f(x) = \cos x, a = \pi/2$  c)  $f(x) = x^3, a = 0$  d)  $f(x) = x^3, a = 1$  e)  $f(x) = \ln x, a = 1$  f)  $f(x) = e^{-x}, a = 0$

2. a) Draw the graph of  $\cos x$  for  $0 \leq x \leq \pi/2$ . From your picture, explain why

$$x = \cos x$$

has exactly one solution  $x$  between 0 and  $\pi/2$ . b) Replace  $\cos x$  by its quadratic approximation  $Q(x)$  at  $a = 0$ . Show that the equation

$$x = Q(x)$$

has the solution

$$x = \sqrt{3} - 1.$$

d) Verify, using a calculator, that  $\cos(\sqrt{3} - 1)$  is indeed quite close to  $\sqrt{3} - 1$ .