Further mathematics for economists
Exercise Sheet 2 - Integration

1. Compute the following indefinite integrals

   (a) $\int \frac{dx}{x^2+5x+6}$

   Hint: reduce the integrand to the form $\frac{A}{x+a} + \frac{B}{x+b}$, where A, B, a, b are constants

   (b) $\int \frac{dx}{1+e^x}$

   Hint: use integration by substitution and the trick in (a)

   (c) $\int \ln x\, dx$

   Hint: use integration by parts

   (d) $\int x^2 \cos x\, dx$, $a = const.$

   Hint: use integration by parts recursively

   (e) $\int \frac{dx}{a+x^2}$, $a = const.$

   Hints:

   - Use integration by substitution
   - Note that $1 + (\tan u)^2 = (\sec u)^2$ and that $d(\tan u)/du = \sec^2 u$ (u is a variable)

   (f) $\int \sqrt{1 - x^2}\, dx$

   Hints:

   - Note that $\sqrt{1 - x^2} = \frac{1-x^2}{\sqrt{1-x^2}}$
   - Use integration by substitution
   - Use integration by parts