1. Use the fundamental theorem of calculus to find the definite integrals.

   (a) $\displaystyle\int_1^e \frac{1}{x}\, dx \;=\;$

   (b) $\displaystyle\int_{-1}^1 \left(x^2 + x\right) dx \;=\;$

   (c) $\displaystyle\int_0^1 \frac{1}{1+x^2}\, dx \;=\;$

2. Find $\displaystyle\int \cos^6(x)\,\sin(x)\, dx$