1. Evaluate the following integrals.

   a) (5 pt) $\int \sec^3(x)\, dx$.

   b) (5 pt) $\int \sin(2x) e^{\sin(x)}\, dx$.

   c) (5 pt) $\int \sin^4(x)\, dx$.

   d) (5 pt) $\int \sec(x) \tan^3(x)\, dx$.

2. (5 pt) Consider the region bounded by $f(x) = |a| \sin(x)$, $0 \le x \le \pi$. Find the value(s) of a such that the volume obtained when this region is revolved about the x-axis is equal to the volume obtained when the region is revolved about the y-axis.