1. Evaluate the following anti-derivatives.
   (a) $\int \cos^2 x \sin^2 x \, dx$
   (b) $\int \cos^5 x \sin^2 x \, dx$
   (c) $\int \sec^5(2x) \tan^3(2x) \, dx$
   (d) $\int \sec^4(3x) \tan^4(3x) \, dx$
   (e) $\int x^2 \sin x \, dx$
   (f) $\int \frac{x^2}{\sqrt{10 - x^2}} \, dx$
   (g) $\int \frac{1}{(1+x^2)^2} \, dx$
   (h) $\int \frac{x}{\sqrt{36 - x^2}} \, dx$

2. The equation of an ellipse is given by
   \[
   \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1.
   \]
   (a) Set up an integral to find the area enclosed by the ellipse. Use symmetry to make your integral easier!
   (b) Evaluate the integral you found in part (a).
   (c) If $a = b$, what shape do we get? How does the formula for the area of this shape correspond to the formula you found in part (b)?