Compute the following integrals.

1. $\displaystyle \int x^5 \cos(x^2)\ dx$

2. $\displaystyle \int x^3 \sqrt{5-x^2}\ dx$

3. $\displaystyle \int \cos^2 x \sin(2x)\ dx$

4. $\displaystyle \int \tan^2 x\ dx$

5. $\displaystyle \int x \sec x \tan x\ dx$

6. $\displaystyle \int x \sin^2 x\ dx$