You may use table of basic antiderivatives, or "reverse of differentiation" to find a general antiderivative $F(x) + C$ for the function $f(x)$.

1. **Find general antiderivative for the given functions.** Assume that all functions are defined for all positive real number.
   - a) $f(x) = 4x^5$
   - b) $f(x) = 5x^4$
   - c) $f(x) = x^{-1}$
   - d) $f(x) = \sin(3x)$
   - e) $f(x) = \cos(5x + 1)$
   - f) $f(x) = 5\sec^2(2x - 1)$
   - g) $f(x) = \frac{2\sqrt{x^2 + x^3}}{x^2}$
   - h) $f(x) = e^{3x}$
   - i) $f(x) = 2xe^{x^2}$

2. a) Find $\frac{dy}{dx}$ for $y = e^{\tan^3x}$.
   b) Let $f(x) = \sec^2(5x)e^{\tan(5x)}$, find $F(x)$ such that $F'(x) = f(x)$.

3. a) Find $\frac{dy}{dx}$ for $y = \sin^2(3x)$. and for $y = \sin^5(3x)$.
   b) Let $f(x) = 15\cos(5x)\sin(5x)$, find general antiderivative for $f(x)$.
   c) Let $f(x) = 15\cos(5x)\sin^2(5x)$, find general antiderivative for $f(x)$.

4. a) Find $\frac{dy}{dx}$ for $y = \ln(x^3 + 3x + 6)$.
   b) Let $f(x) = \frac{x^4 + 4x}{x^2 + 5x + 16}$, find general antiderivative for $f(x)$.
   c) Let $f(x) = \tan(x)$, find general antiderivative for $f(x)$.
   d) Let $f(x) = \tan(7x)$, find general antiderivative for $f(x)$.
   e) Let $f(x) = \tan(7x + 9)$, find general antiderivative for $f(x)$.

5. **Find a function $f(x)$ whose antiderivative is given as $y = f(x)$ for**
   - a) $y = x^{\sin x}$
   - b) $y = (x^3)e^{x^2}$
   - c) $y = \frac{1}{2}e^x \cos(x)$
   - d) $y = \ln(\cos x)$
   - e) $y = \sin(g(x))$
   - f) $y = \ln(\ln x)$
   - g) $y = e^{x^2 + x}$
   - h) $y = \ln(x + 1) + \frac{1}{x+1}$