1. Suppose we want to find a function $F(x)$ such that $F'(x) = x^5$.
   (a) Find one function $F(x)$ such that $F'(x) = x^5$.
   (b) Find another one. What do you think all possible $F(x)$ look like?
2. Same, but find all $F(x)$ such that $F'(x) = x^{-3}$, then $F'(x) = \sqrt[3]{x}$, then $F'(x) = \dfrac{1}{\sqrt{x}}$.
3. Same, but $F'(x) = x^{-1}$.
4. Same, but $F'(x) = \cos x$, then $F'(x) = \sin x$.
5. Same, but $F'(x) = e^x$, then $F'(x) = 3^x$, then $F'(x) = a^x$ $(a > 0)$.
6. Same, but $F'(x) = 5x^7$.
7. Same, but $F'(x) = e^x - \cos x + 3\sqrt{x}$.
8. Same, but $F'(x) = \frac{1}{\ln x}$.
9. Same, but $F'(x) = xe^x$.
10. Same, but $F'(x) = e^{7x}$.
11. Same, but $F'(x) = e^{x^2}$.

Additional problems:
Consider the following twelve functions:

$$f_1(x) = \frac{5 - 3x + x^7}{x} \qquad g_1(x) = x\sin(x^2)$$
$$f_2(x) = \frac{x^{84} - 7x^{27}}{85} \qquad g_2(x) = e^x + x^3$$
$$f_3(x) = \cos(x^2) \qquad g_3(x) = \frac{1}{\ln x}$$
$$f_4(x) = 3\cos x + \sec^2 x \qquad g_4(x) = \frac{7}{\sqrt{x}} - 17\sqrt[5]{x}$$
$$f_5(x) = (x^2 + 4)(x - x^3) \qquad g_5(x) = 11x^2\sqrt{x} + 13$$
$$f_6(x) = 5\sin x - 7^x \qquad g_6(x) = xe^x$$

It turns out that you can compute the antiderivatives of eight of these functions using our rules to date, possibly along with some algebra. Two of the other functions can only be computed using methods we haven't learned yet, and the remaining two actually do not have antiderivatives expressible in terms of ordinary functions you have seen.

1. Identify the four whose antiderivatives you can't compute yet, and in your groups, discuss why our current rules do not suffice to compute them.

2. Compute the other eight general antiderivatives. **DO NOT SIMPLIFY** your answers.