Fundamental Theorem of Calculus: If $F$ is an antiderivative of $f$, then

$$\int_a^b f(x)dx = F(b) - F(a)$$

Problem 1. Find a function $f$ and a constant $a$ such that:

$$6 + \int_a^x \frac{f(t)}{t^2} dt = 2\sqrt{x}$$

Problem 2. Compute the derivative of the following functions:

1. $$\int_1^x \sqrt{t + \sqrt{t}} dt$$

2. $$\int_a^{x^3} \frac{t}{1+t^4} dt$$

3. $$\int_{\cos x}^{\cos x} \frac{\sin t \cos t}{\sin x} dt$$