Math 2B Worksheet: 5.3 The Fundamental Theorem of Calculus

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1. Find the derivatives of the following functions.

   (a) $g(x) = \int_1^x \ln(1+t^2)\,dt$

   (b) $R(y) = \int_y^2 t^3 \sin t\,dt$

2. Evaluate the following integrals.

   (a) $\int_1^8 x^{-2/3}\,dx$

   (b) $\int_1^3 \dfrac{y^3 - 2y^2 - y}{y^2}\,dy$

3. Let $F(x) = \int_2^x e^{t^2}\, dt$. Find an equation for the line tangent to the curve $y = F(x)$ at $x = 2$.

4. If $f(1) = 12$, f' is continuous, and $\int_1^4 f'(x)\, dx = 17$, what is the value of $f(4)$.