

AP Calculus AB**Section 3.3: The Fundamental Theorems****Worksheet 13c: The Second Fundamental Theorem**

Use the Second Fundamental Theorem of Calculus to find the derivatives.

1. $\frac{d}{dx} \int_1^x \sin \sqrt{t} \, dt$

2. $\frac{d}{dx} \int_0^x e^{t^2} \, dt$

3. $\frac{d}{dx} \int_0^x \frac{1}{1+\sqrt{t}} \, dt$

4. $\frac{d}{dx} \int_1^x \ln t \, dt$

5. $\frac{d}{dx} \int_x^0 \frac{t}{\cos t} \, dt$ [Hint: Watch the limits of integration!]

6. $\frac{d}{du} \int_0^u |x| \, dx$

7. $\frac{d}{dx} \int_0^{x^2} \cos t \, dt$

8. Let $F(x) = \int_2^x \sqrt{3t^2 + 1} \, dt$. Find

(A) $F(2)$

(B) $F'(2)$

(C) $F''(2)$

9. Let $F(x) = \int_0^x \frac{t-3}{t^2+7} dt$ for $(-\infty, \infty)$.

(A) Find all values of x where F attains its minimum value.

(B) Find intervals over which F is only increasing or only decreasing.

(C) Find open intervals over which F is only concave up or only concave down.