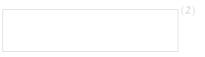
§5.3:	Inde	FINITE	INTEG	GRALS	5	
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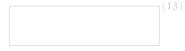
NAME:	
	September 5, 2017

ONE-PAGE REVIEW

- (1) F is called an **antiderivative** of f if (a, b) differ by a constant.
- (2) **Fundamental Theorem of Calculus, Part I (FTC I):** if F(x) is an antiderivative for f(x), then



- (3) (a) $\int 0 dx =$ (3)
 - (b) $\int k \, dx =$
 - (c) $\int cf(x) dx = \int_{0}^{1} cf(x) dx$
 - (d) $\int (f(x) + g(x)) dx =$ (6) +
 - (e) $\int x^n dx = \int_{-\infty}^{\infty} dx$
 - (f) $\int \sin x \, dx =$
 - $(g) \int \sec^2 x \, dx =$
 - (h) $\int \sec x \tan x \, dx =$
- (4) To solve an initial value problem $\frac{dy}{dx} = f(x)$, $y(x_0) = y_0$, first find the general antiderivative y = F(x) + C. Then determine C using the initial condition $F(x_0) + C = y_0$.
- (5) The **area function** with lower limit a is $A(x) = \begin{bmatrix} 12 \\ 12 \end{bmatrix}$.
- (6) Fundamental Theorem of Calculus, Part II (FTC II):



- (7) A consequence of FTC II is that every continuous function has an antiderivative.
- (8) Let $G(x) = \int_{\alpha}^{g(x)} f(t) dt$. Let $A(x) = \int_{\alpha}^{x} f(t) dt$. Then

$$\frac{d}{dx}G(x) = \frac{d}{dx} \int_{\alpha}^{g(x)} f(t) dt =$$

PROBLEMS

(1) Evaluate the integral:

(a)
$$\int \cos x \, dx$$

(b)
$$\int \csc x \cot x \, dx$$

(c)
$$\int \frac{3}{x^{3/2}} dx$$

(d)
$$\int_{-2}^{2} (10x^9 + 3x^5) dx$$

(e)
$$\int_0^4 \sqrt{x} \, dx$$

(f)
$$\int_{\pi/4}^{3\pi/4} \sin\theta \, d\theta$$

(g)
$$\int_0^5 |x^2 - 4x + 3| dx$$

(h)
$$\int_{4}^{9} \frac{16+t}{t^2} dt$$

- (2) Solve the differential equation $\frac{dy}{dx}=8x^3+3x^2-3$ with initial condition y(1)=1.
- (3) Given that $f''(x) = x^3 2x + 1$, f'(0) = 1, and f(0) = 0, find f' and then find f.
- (4) If $G(x) = \int_1^x \tan t \, dt$, find G(1) and $G'(\pi/4)$.
- (5) Find a formula for the function represented by the integral: $\int_2^x (t^2-t) dt$.
- (6) Express the antiderivative F(x) of f(x) as an integral, given that $f(x) = \sqrt{x^4 + 1}$ and F(3) = 0.
- (7) Calculate the derivative: $\frac{d}{dx} \int_{1}^{x^3} \tan t \, dt$.