

AP Calculus AB - Unit 5 Outline – Basic Integration

Wednesday 10/23	Today's Topic: Basic Integration: The process of integration is essentially “backwards derivatives”.		
In-Class Examples: Integrate (Find			
1. $\int (x^7 - 6x + 8) dx$	2. $\int \left(x^3 - \frac{1}{x^3} \right) dx$	3. $\int x^{-1} dx$	4. $\int \csc x \cot x dx$
5. $\int (x - 2)^3 dx$	6. $\int \frac{x - 4}{x^2} dt$	7. $\int \sin(2x) dx$	8. $\int e^{4x} dx$
AP Multiple Choice			
Which of the following is an antiderivative of $3\sec^2 x + 2$?			
(A) $3 \tan x$	(B) $3 \tan x + 2x$	(C) $3 \sec x + 2x$	(D) $\sec^3 x + 2x$ (E) $6 \sec^2 x \tan x$
$\int \left(5e^{2x} + \frac{1}{x} \right) dx =$			
(A) $\frac{5}{2}e^{2x} + \frac{2}{x^2} + C$	(B) $\frac{5}{2}e^{2x} + \ln x + C$	(C) $5e^{2x} + \frac{2}{x^2} + C$	
(D) $5e^{2x} + \ln x + C$	(E) $10e^{2x} - \frac{1}{x^2} + C$		
Homework: Worksheet 43			

Thursday 10/24	Today's Topic: "Most Complicated" Rule – Pattern Recognition		
Warm-Up: Find $f'(x)$. 1) $f(x) = (3x^2 + 4)^5$ 2) $f(x) = \sqrt{(x^3 - 3)^3}$ 3) $f(x) = \sin e^x$			
In-Class Examples: Integrate the following:			
1. $\int 28(7x - 2)^{-5} dx$	2. $\int x^2 \sqrt{x^3 - 2} dx$	3. $\int 6 \cos t (\sin t)^{-3} dt$	
4. $\int x e^{x^2} dx$	5. $\int \frac{x}{x^2 + 4} dx$	6. $\int e^x \sec^2(e^x) dx$	
Homework: Worksheet 44			

Friday 10/25	Today's Topic: "Most Complicated" Rule		
In-Class Examples: We will continue to improve doing the "Most Complicated" Rule			
Ex. 1 $\int \frac{\cos x}{\sqrt{4+3\sin x}} dx$	Ex. 2 $\int \frac{10\sqrt{x}}{\left(1+x^{3/2}\right)^2} dx$	Ex. 3 $\int \frac{\ln^6 x}{x} dx$	Ex. 4 $\int \sec^2 x \tan x dx$
AP Multiple Choice $\int x^2 (x^3 + 5)^6 dx =$ (A) $\frac{1}{3}(x^3 + 5)^6 + C$ (B) $\frac{1}{3}x^3\left(\frac{1}{4}x^4 + 5x\right)^6 + C$ (C) $\frac{1}{7}(x^3 + 5)^7 + C$ (D) $\frac{3}{7}x^2(x^3 + 5)^7 + C$ (E) $\frac{1}{21}(x^3 + 5)^7 + C$			
Homework: Worksheet 45			

Monday 10/28	Today's Topic: Integration of Inverse Trigonometric Functions					
In-Class Examples:	Ex. 1	$\int \frac{dx}{\sqrt{4-x^2}}$	Ex. 2	$\int \frac{dx}{\sqrt{9-4x^2}}$	Ex. 3	$\int \frac{dx}{2+9x^2}$
	Ex. 4	$\int \frac{x}{1+x^4} dx$	Ex. 5	$\int \frac{1}{\sqrt{1-x^2} \arcsin x} dx$	Ex. 6	$\int \frac{1+x}{1+x^2} dx$
Homework: Worksheet 46						

Tuesday 10/29	Today's Topic: Definite Integrals
Fundamental Theorem of Calculus, Part 1: If $F(x)$ is an antiderivative of $f(x)$, then $\int_a^b f(x) dx = (F(x) + C)\big _a^b = F(b) - F(a)$.	
In-Class Examples: Evaluate the definite integral 1. $\int_1^4 (x^2 - 3x) dx$ 2. $\int_{-\pi}^{2\pi} \sin x dx$ 3. $\int_1^e \frac{1}{x} dx$	
AP Multiple Choice If $g(x) = x^2 - 3x + 4$ and $f(x) = g'(x)$, then $\int_1^3 f(x) dx =$ (A) $-\frac{14}{3}$ (B) -2 (C) 2 (D) 4 (E) $\frac{14}{3}$	
$\int_2^4 \frac{dx}{5-3x} =$ (A) $-\ln 7$ (B) $-\frac{\ln 7}{3}$ (C) $\frac{\ln 7}{3}$ (D) $\ln 7$ (E) $3\ln 7$	
Homework: Worksheet 47	

Wednesday 10/30	Today's Topic: Integrate with initial values – If you are given an initial value to a function (namely a point on the graph of the function), you must plug the values into the antiderivative in order to find “C”.
In-Class Examples: Ex. 1 Find all functions y that satisfy $\frac{dy}{dx} = \sec^2 x + 2x + 5$. Ex. 2 Find the <u>particular solution</u> to the equation $\frac{dy}{dx} = e^x - 6x^2$ whose graph passes through the point $(1, 0)$.	
AP Multiple Choice If $f'(x) = \frac{2}{x}$ and $f(\sqrt{e}) = 5$, then $f(e) =$ (A) 2 (B) $\ln 25$ (C) $5 + \frac{2}{e} - \frac{2}{e^2}$ (D) 6 (E) 25	
Homework: Worksheet 48	

Thursday 10/31 – Review Worksheet 49

Monday 11/4 – Unit 5 Exam