

Quiz 1 Calc II Integration Review Summer '09 Name: _____

Please show all work neatly on paper and attach to this page. **Due Date: 6/8/09**

1. $\int (x^2 + 5x)dx$

2. $\int (\frac{1}{x^2} + 5 \sin x)dx$

3. $\int (e^x + 5x^{3/5})dx$

4. $\int \frac{1}{2}(e^x + e^{-x})dx$

5. $\int (5 + \frac{1}{\sqrt[3]{x}})dx$

6. $\int (\cos x + 5 \sec^2 x)dx$

7. $\int (\sec x \tan x)dx$

8. $\int (\csc x \cot x)dx$

9. $\int \frac{x^2 + 5}{x}dx$

10. $\int e^x(2 + e^{-x})dx$

11. $\int x(x^2 + 5x)dx$

12. $\int \frac{2x}{x^2 + 7}dx$

13. $\int \frac{1}{\sqrt{1-x^2}}dx$

14. $\int \cot x dx = \int \frac{\cos x}{\sin x} dx$

15. $\int \tan x dx = \int \frac{\sin x}{\cos x} dx$

16. $\int \frac{\ln x}{x} dx$

17. $\int \frac{1}{x \ln x} dx$

18. $\int \frac{x}{(x^2 + 7)^4} dx$

19. $\int \frac{\sin x dx}{\cos^2 x}$

20. $\int e^x \cos e^x dx$

21. $\int \frac{dx}{\sqrt{3x+7}}$

22. $\int \frac{dx}{(3x+5)^4}$

23. $\int \frac{dx}{\sqrt{x}(1+\sqrt{x})^4}$

24. $\int \frac{\cos(\ln x) dx}{x}$

25. $\int \frac{\ln x^2}{x} dx$

26. $\int \frac{x dx}{(ax+b)^2}, a \neq 0$

27. $\int \frac{x^2 dx}{(ax+b)^2}, a \neq 0$

$$28. \int_0^2 (x^2 - 2) dx$$

$$29. \int_{-1}^2 e^{3x} dx$$

$$30. \int_2^3 \frac{e^{1/x}}{x^2} dx$$

$$31. \int_{\pi/6}^{\pi/4} \tan x \sec^2 x dx$$

$$32. \int_1^e \frac{(\ln x)^3}{x} dx$$

$$33. \int_0^4 f(x) dx \text{ if } f(x) = \begin{cases} x-1 & x < 1 \\ 2 & x \geq 1 \end{cases}$$

38. How often should a machine be overhauled? This depends on the rate $f(t)$ at which it depreciates and the cost A of overhaul. Denote the time interval between overhauls by T .

a) Explain why you would like to minimize $g(T) = \frac{\left[A + \int_0^T f(t) dt \right]}{T}$.

b) Find $\frac{dg}{dT}$.

c) Show that when $\frac{dg}{dT} = 0$, $f(T) = g(T)$

d) Is this reasonable? Sure, why not?

34. Differentiate $f(x) = \int_1^x t^4 dt$

35. Differentiate

$$f(x) = \int_1^{\sqrt{x}} \frac{1}{t^4} dt \text{ Differentiate}$$

$$f(x) = \int_0^{\sin x} \sqrt{1+t^3} dt$$

36. Differentiate $f(x) = \int_{x^2}^{15} \sin^3 2t dt$

37. Differentiate $f(x) = \int_{2x}^{3x} t \tan t dt$

Function	Derivative	Integral	Function
x^n	nx^{n-1}	$\int x^n$	$\frac{x^{n+1}}{n+1} + C, n \neq -1$
$\ln x $	$\frac{1}{x}$	$\int \frac{1}{x}$	$\ln x + C$
$\sin x$	$\cos x$	$\int \cos x$	$\sin x + C$
$\cos x$	$-\sin x$	$\int \sin x$	$-\cos x + C$
$\tan x$	$\sec^2 x$	$\int \sec^2 x$	$\tan x + C$
$\sec x$	$\sec x \tan x$	$\int \sec x \tan x$	$\sec x + C$
$\csc x$	$-\csc x \cot x$	$\int \csc x \cot x$	$-\csc x + C$
$\cot x$	$-\csc^2 x$	$\int \csc^2 x$	$-\cot x + C$
e^x	e^x	$\int e^x$	$e^x + C$
b^x	$\ln b \cdot b^x$	$\int b^x$	$\frac{1}{\ln b} b^x + C$
$\log_b x$	$\frac{1}{x \ln b}$		
$\sin^{-1} x$	$\frac{1}{\sqrt{1-x^2}}$	$\int \frac{1}{\sqrt{1-x^2}}$	$\sin^{-1} x + C$
$\cos^{-1} x$	$\frac{-1}{\sqrt{1-x^2}}$	$\int \frac{-1}{\sqrt{1-x^2}}$	$\cos^{-1} x + C$
$\tan^{-1} x$	$\frac{1}{1+x^2}$	$\int \frac{1}{1+x^2}$	$\tan^{-1} x + C$
k (constant)	0	$\int k$	$kx + C$
kf	kf'	$\int kf$	$k \int f$
$f \pm g$	$f' \pm g'$	$\int f \pm g$	$\int f \pm \int g$
$\frac{f}{g}$	$\frac{gf' - fg'}{g^2}$		
fg	$fg' + gf'$	$\int fg$	Integration by parts
$(f \circ g)(x)$	$f'(g(x))g'(x)$	$\int f'(g(x))g'(x)dx$	u-substitution: Let $g(x) = u$, then $= \int f'(u) du$