SI Session: April,14th &16th, 2009
Tuesdays: 3:30 PM – 5:00 PM
Thursdays: 1:30 PM – 3:00 PM
& 3:30 PM – 5:00 PM
Room 1245 SNAD

Prof. Stockton : Calculus I
Spring 2009
SI Leader : Neil Jody

[1] Find each antiderivative.

(a) $\int\left(-8x^3+15x^5\right)dx$

(b) $\int\left(\sec^2 x\right)dx$

(c) $\int\left(x^3-3x+\sqrt[4]{x}-5\right)dx$

(d) $\int x\left(x+\sqrt{x}\right)dx$

(e) $\int\left(\frac{x^2+3x-1}{x^4}\right)dx$

(f) $\int y^2 \sqrt{y}\, dy$

(g) $\int \sec y \left(\tan y - \sec y \right) dy$

(h) $\int \left(t^2 - \sin t \right) dt$

(i) $\int \left[3\sin x - 2\sec^2 x \right] dx$

(j) $\int \left[\csc^2 t - \sec t \tan t \right] dt$

(k) $\int \sec x \left(\sec x + \tan x \right) dx$

(l) $\int \csc x\left(\sin x + \cot x\right) dx$

(m) $\int \frac{\sec\theta}{\cos\theta}\, d\theta$

(n) $\int \frac{dy}{\csc y}$

(o) $\int \frac{\sin x}{\cos^2 x}\, dx$

(p) $\int \left[\phi + \frac{2}{\sin^2\phi}\right] d\phi$

(q) $\int \left[1 + \sin^2\theta \csc\theta\right] d\theta$

(r) $\int \frac{\sec x + \cos x}{2\cos x}\, dx$

[2] Use the summation formulas to rewrite the expression without the summation notation. Use the result to find the sum for n=10.

$$\sum_{k=1}^{n} \frac{6k(k-1)}{n^3}$$

[3] Find the formula for the sum on n terms. Use the formula to find the limit as $n \to +\infty$.

$$\lim_{n\to+\infty} \sum_{k=1}^{n} \frac{1}{n^3}(k-1)^2$$

[5] Use the limit process to find the area of the region between the graph of the function and the x-axis over the given interval.

(a) $f\left(x\right)=2x-2x^2\ ,x\in\left[0,1\right]$

(b) $f\left(x\right)=x^3-1\ ,x\in\left[0,2\right]$

1. $\frac{d}{dx}\left[c\,f(x)\right] = c\,\frac{d}{dx}\left[f(x)\right]$

2. $\frac{d}{dx}\left[f(x) \pm g(x)\right] = \frac{d}{dx}\left[f(x)\right] \pm \frac{d}{dx}\left[g(x)\right]$

3. $\frac{d}{dx}\left[\mathrm{f}(x)g(x)\right] = \mathrm{f}'(x)g(x) + \mathrm{f}(x)g'(x)$

4. $\frac{d}{dx}\left[\frac{\mathrm{f}(x)}{g(x)}\right] = \frac{\mathrm{f}'(x)g(x) - \mathrm{f}(x)g'(x)}{\left(g(x)\right)^2}$

5. $\int cf(x)\,dx = c\int f(x)\,dx$

6. $\int\left[f(x) \pm g(x)\right]dx = \int f(x)\,dx \pm \int g(x)\,dx$

7. $\int x^n dx = \frac{x^{n+1}}{n+1} + C, \text{if } n \neq -1$

8. $\int x^n dx = \ln|x| + C, \text{if } n = -1$

9. $\int \sin x\,dx = -\cos x + C$

10. $\int \cos x\,dx = \sin x + C$

11. $\int \sec^2 x\,dx = \tan x + C$

12. $\int \csc^2 x\,dx = -\cot x + C$

13. $\int \sec x \tan x\,dx = \sec x + C$

14. $\int \csc x \cot x\,dx = -\csc x + C$

15. $\int \sec x\,dx = \ln|\sec x + \tan x| + C$

16. $\int \tan x\,dx = -\ln|\cos x| + C$

17. $\int \cot x\,dx = \ln|\sin x| + C$

18. $\int \csc x\,dx = \ln|\csc x - \cot x| + C$

19. $\sin^2(\theta) + \cos^2(\theta) = 1$

20. $\tan^2(\theta) + 1 = \sec^2(\theta)$

21. $1 + \cot^2(\theta) = \csc^2(\theta)$

22. $\sin(2\theta) = 2\sin(\theta)\cos(\theta)$

23. $\cos(2\theta) = \begin{cases} \cos^2(\theta) - \sin^2(\theta) \\ 2\cos^2(\theta) - 1 \\ 1 - 2\sin^2(\theta) \end{cases}$

24. For all real numbers y, and all positive numbers a and x, where $a \neq 1$:

$\log_b x = y \Leftrightarrow b^y = x$

For $x > 0, y > 0, a > 0, a \neq 1$, and any real number r:

$\log_b x^r = r \cdot \log_b x$

$\log_b xy = \log_b x + \log_b y$

$\log_b\left(\frac{x}{y}\right) = \log_b x - \log_b y$

For any positive real numbers x, a, and b, where $a \neq 1$ and $b \neq 1$:

$\log_b x = \frac{\log x}{\log b} = \frac{\ln x}{\ln b} = \frac{\log_a x}{\log_a b}$

1.) $\Delta x = \frac{b-a}{n}$

2.) the right endpoint of the k^{th} interval is $a + k\Delta x$.

3.) $S_n = \sum_{k=1}^{n} f\left(a + k\Delta x\right)\Delta x$

4.) $\text{Area} = \lim_{n\to\infty} S_n$

(a) $\sum_{k=1}^{n} k = \frac{n(n+1)}{2}$

(b) $\sum_{k=1}^{n} k^2 = \frac{n(n+1)(2n+1)}{6}$

(c) $\sum_{k=1}^{n} k^3 = \frac{n^2(n+1)^2}{4}$

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