SI Session: July 3rd
Mondays – Thursdays
12:30 PM – 2:00 PM
Room 1229

Prof. Stockton : Calculus I
Summer I 2008
SI Leader : Neil Jody

[1] Use the given information to evaluate and compare dy and Δy.

(a) $y = 1 - 2x^2$; $x = 0$; $\Delta x = dx = -0.1$

(b) $y = 2x + 1$; $x = 2$; $\Delta x = dx = 0.01$

[2] Find the indefinite integral.

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

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

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

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

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

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

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

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

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 $a\neq1$:

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

For $x>0, y>0, a>0, a\neq1$, 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 $a\neq1$ and $b\neq1$:

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

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

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

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

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

www.neiljody.com