SI Session Week 6
Thursdays 4:00 – 5:30 PM, Rm. 1229
Fridays 2:00 – 3:30 PM. Rm. 1223

Prof. Stockton : Calculus I : Fall 2007
SI Leader : Neil Jody

Directions: Evaluate and/or calculate as indicated.

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

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

1. A runner starts at a point "A" and heads East at a rate of 10 ft/sec. One minute later another runner starts at "A" heading North at 8 ft/sec. At what rate is the distance between them changing 1 minute after the 2nd runner starts?

2. The area of an equilateral triangle is decreasing at a rate of 4 cm^2 /min. Find the rate at which the length of a side is changing when the area of the triangle is 200 cm^2 .

3. A baseball diamond has the shape of a square with sides 60ft long. If a player is running from second base to third at a speed of 24ft/sec, at what rate I her distance from home plate changing when she is 20ft from third?

4. A stone is dropped into a lake causing circular waves whose radii increase at a constant rate 0f 0.5m/sec. At what rate is the circumference of a wave changing when its radius is 4m?

5. Boyle's law for gases states that pv=c, for pressure p, volume v, and a constant c. At a certain instant the volume in 75 in^3 , the pressure is 30 lb/in^2 , and the pressure is decreasing at a rate of 2 lb/in^2 /min. At what rate is the volume changing at this instant?

6. Gas is escaping from a spherical balloon at a rate of 10 ft^3/hr . At what rate is the radius changing when the volume is 400 ft^3 ?

7. $\frac{d}{dx}\left[\cos(xy^2)=y\right]$

8. $\frac{d}{dx}\left[\tan^3(xy^2+y)=x\right]$

9. $\frac{d}{dx}\left[x^2y+3xy^3-x=3\right]$

10. $\frac{d}{dx}\left[x^3+y^3=3xy^2\right]$

11. $\frac{d}{dx}\left[x^2=\frac{x+y}{x-y}\right]$

12. $\frac{d}{dx}\left[\frac{1}{\sqrt{x}}+\frac{1}{\sqrt{y}}=1\right]$

13. $\frac{d}{dx}\left[\frac{x^2y^3}{1+\sec(y)}=1+y^4\right]$

14. $\frac{d}{dx}\left[\tan^4\left(x^3\right)\right]$

15. $\frac{d}{dx}\left[\cos^3\left(\frac{x}{x+1}\right)\right]$

16. $\frac{d}{dx}\left[\sqrt{\cos(5x)}\right]$

17. $\frac{d}{dx}\left[\sqrt{3x-\sin^2(4x)}\right]$

18. $\frac{d}{dx}\left\{\left[x+\csc(x^3+3)\right]^{-3}\right\}$

19. $\frac{d}{dx}\left[\sqrt{x}\tan^3\left(\sqrt{x}\right)\right]$

20. $\frac{d}{dx}\left[x^5\sec\left(\frac{1}{x}\right)\right]$

21. $\frac{d}{dx}\left[\frac{1+\csc\left(x^2\right)}{1-\cot\left(x^2\right)}\right]$

22. $\frac{d}{dx}\left[\frac{\left(2x+3\right)^3}{\left(4x^2-1\right)^8}\right]$

23. If $y=\sec^3\left(\frac{\pi}{2}-x\right)$,
find equation of tangent line at $x=-\frac{\pi}{2}$

24. $\frac{d^2y}{dx^2}\left[x\cos(5x)-\sin^2(x)\right]$

25. $\frac{d^2y}{dx^2}\left[x\tan\left(\frac{1}{x}\right)\right]$

26. Find the extrema of $f(x)=\sqrt[3]{x^2}-x$,on the interval $\left[-1,2\right]$