

## L-6 Applications Of Derivatives (Worksheet Mod 3 of 3)

### Do as directed.

1. Find local maximum and local minimum values of the function  $f$  given by  $f(x) = 3x^4 + 4x^3 - 12x^2 + 12$ .
2. Find the absolute maximum and minimum values of a function  $f$  given by  $f(x) = 2x^3 - 15x^2 + 36x + 1$  on the interval  $[1, 5]$ .
3. Find the maximum profit that a company can make, if the profit function is given by  $p(x) = 41 - 72x - 18x^2$ .
4. At what points in the interval  $[0, 2\pi]$ , does the function  $\sin 2x$  attain its maximum value?
5. Find two positive numbers whose sum is 16 and the sum of whose cubes is minimum.
6. Prove that the volume of the largest cone that can be inscribed in a sphere of radius  $R$  is  $\frac{8}{27}$  of the volume of the sphere.
7. A window is in the form of a rectangle surmounted by a semicircular opening. The total perimeter of the window is 10 m. Find the dimensions of the window to admit maximum light through the whole opening.
8. If the function  $f(x) = 2x^3 - 9mx^2 + 12m^2x + 1$  attains its maximum and minimum values at  $p$  and  $q$  respectively such that  $p^2 = q$ , then find the value of  $m$ .
9. For all real values of  $x$ , the minimum value of  $\frac{1-x+x^2}{1+x+x^2}$  is  
a) 0                                      b) 1                                      c) 3                                      d)  $\frac{1}{3}$
10. The maximum value of  $[x(x-1) + 1]^{\frac{1}{3}}$ ,  $0 \leq x \leq 1$  is  
a)  $\left(\frac{1}{3}\right)^{\frac{1}{3}}$                                       b)  $\frac{1}{2}$                                       c) 1                                      D) 0