Quiz 7 Solutions, Math 220, Professor David Levermore
Friday, 15 October 2010

(1) [6] Find the first derivatives of

(a) $f(x) = (x+2)^3(2x-7)^{\frac{5}{2}}$

Solution. $f'(x) = 3(x+2)^2(2x-7)^{\frac{5}{2}} + (x+2)^3\frac{5}{2}(2x-7)^{\frac{3}{2}}2$

(b) $h(t) = \dfrac{t^3-5t+6}{t^4+3}$

Solution. $h'(t) = \dfrac{(3t^2-5)(t^4+3)-(t^3-5t+6)4t^3}{(t^4+3)^2}$

(2) [4] An artist plans to sell signed prints of her latest work. If she offers 100 prints for sale she can charge 600 dollars each. She must lower the price of all prints by two dollars each for each print she offers in excess of 100. How many print should she offer to maximize her revenue?

Solution. Let x be the number of prints to be offered for sale. In order to sell x prints demand requires that they be sold for $600 - 2(x-100)$ dollars each. The revenue generated will therefore be

$$R(x) = x\big(600 - 2(x-100)\big) = x(600 - 2x + 200) = x(800 - 2x) = 800x - 2x^2\,.$$

This quadratic function will be maximized when

$$R'(x) = 800 - 4x = 0\,,$$

which is when $x = \frac{800}{4} = 200$. Therefore she will maximize her revenue by offering 200 prints for sale.