Quiz #7 101 Math 013

Name:	I.D.		

1. Find the absolute extrema for the function $f(x)=2x^3-3x^2-12x+1$ in $[-2,3]$

$f'(x) = 6[x^2 - x - 2] = 6(x+1)(x-2)$ critical points $-1, 2$

$f(-1)=8$ $f(2)=-19$ $f(-2)=-3$ end points $-2, 3$

$f(3)=-8$

$x=2$ is Abs. min

$x=-1$ is Abs max.

2. Let $f(x)=|2-x|$ show that there is no c such that $\frac{f(3)-f(1)}{3-1}=f'(c)$, explain why this does not contradict the Mean Value Th.

$f'(x)=-1$ if $x>2$ $f'(x)=1$ if $x<2$ but $\frac{f(3)-f(1)}{3-1}=\frac{1-1}{2}=0$

No neither -1 nor $1=0$ hence there is no c satisfy the above relation, Does not contradict MVT since $f(x)$ Not diff at $x=2$. (Corner)

3. A closed rectangular box with a square base is to have a volume 20,000 cm^3. The material for the bottom of the box will cost 8 S. R. per cm^2, and the material for the sides and the top of the box will cost 2 S. R. per cm^2. Find the dimensions that will minimize the cost of the material.

Area of the bottom $A_1=r^2$

Area of the top and sides $A_2=r^2+4rh$

$V=20,000=r^2h$ $h=\frac{20000}{r^2}$

$[0, 150]$

So the cost function

$f(r)=2[r^2+4rh]+8[r^2]=10r^2+\frac{160,000}{r}$

$f'(r)=20r-\frac{160,000}{r^2}=0 \Rightarrow 20r^3=160,000 \Rightarrow$ $r=20$ $h=50$ dimensions

4. A rock thrown downward with an unknown initial velocity from a height of 1000 ft reaches the ground in 4s, find the velocity of the rock when it hits the ground.

gravity -32

$S(t)=S_0+V_0t-\frac{1}{2}gt^2$

$0=1000+V_0(4)+\frac{1}{2}32(16)$

$V_0=-314$ ft/sec.