MATH 1510 WORKSHEET #7

(1.) $f(x)=(x^3+16)x^{-1}$ $\therefore f'(x)=3x^2(x^{-1})+(x^3+16)(-1x^{-2})$

$$= \frac{3x^3-x^3-16}{x^2} = \frac{2x^3-16}{x^2}$$

Since $x=0$ is not in domain of f
it follows that $x^3=8$ or $x=2$ is only critical number.

x		0		2	
$f'(x)$	$-$		$-$		$+$
$f(x)$	$\searrow$		$\searrow$		$\nearrow$

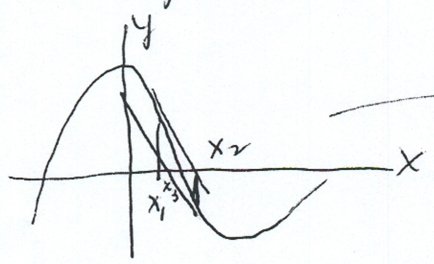
$\therefore f(2)$ is a relative minimum.

(2.) $f'(x)=e^{-x}+x(-e^{-x})=e^{-x}(1-x)$

x		1	
$f'(x)$	$+$		$-$

$\therefore f$ is increasing on $(-\infty,1]$ and decreasing on $[1,\infty)$

(3.)



other reasonable graphs of "tangent lines" are acceptable.

(4.) $\boxed{\text{OMIT}}$

(5.) Since $f'(x)\geq 2$ on $[1,4]$ it follows that f is differentiable,
hence also continuous on $[1,4]$ $\therefore$ The MVT applies to f on $[1,4]$.
Thus, there exists $c\in[1,4]$ such that $\dfrac{f(4)-f(1)}{4-1}=f'(c)$

$$\therefore f(4)-10=3f'(c)$$
$$f(4)=3f'(c)+10$$

But $f'(c)\geq 2$ since $c\in[1,4]$

$\therefore$ $3f'(c)+10\geq 3(2)+10=16$

$\therefore$ minimum value for $f(4)$ is 16

(6.) $f'(x)=6x^2-12x$

and $x_{n+1}=x_n-\dfrac{f(x_n)}{f'(x_n)}=x_n-\dfrac{2x_n^3-6x_n+3}{6x_n^2-12x}$

$$\therefore x_2=x_1-\frac{2(1)^3-6(1)+3}{6(1)^2-12(1)}$$

$$=1-\frac{2-6+3}{6-12}=1-\left(\frac{-1}{-6}\right)=\frac{5}{6}$$