Homework 4-2:

① $f(x)=x^3-3x^2+2x-5$

continuous

differentiable

$f(0)=f(2)=-5$

$f'(x)=3x^2-6x+2=0$

$x^2-2x+\frac{2}{3}=0$

$t=1\pm\sqrt{1/3}$

② Assumes that f

differentiable

③ $f(x)=x\sqrt{x+5}=x(x+5)^{1/2}$

$f'(x)=(x+5)^{1/2}+x(\frac{1}{2})(x+5)^{-1/2}(1)$

$f(x)=\sqrt{x+5}+\frac{x}{2\sqrt{x+5}}$

MVT: $f(b)-f(a)\div b-a$; $[-5,0]$

$\frac{f(-5)-f(0)}{-5-0}=\boxed{0}$

$f'(x)=\frac{3x+10}{2\sqrt{x+5}}=0$; $x=\frac{-10}{3}$

④ $f(x)=2x^3-15x^2-36x+8$

$f'(x)=6x^2-30x-36$

$\frac{f(-4)-f(10)}{-4-10}=\frac{-216}{14}=\boxed{26}$

$f'(x)=26=6x^2-30x-36$

$f'(x)=6x^2-30x-62$

$x=\frac{15\pm\sqrt{597}}{6}$

⑤ $f(x)=\frac{1}{x}$; $f'(x)=\frac{-1}{x^2}$; $[3,11]$

$\frac{f(3)-f(11)}{3-11}=\frac{-1}{33}$

$f'(x)=\frac{-1}{x^2}=\frac{-1}{33}=x=\pm\sqrt{33}$

but only $\sqrt{33}$ in int

⑥ $\frac{f(4)-f(0)}{4-0}=\text{Avg}=f'(c)=8$

$f(4)-5=32$

$f(4)=27$: possible in 27

⑦ $f(x)=3\sin x$; $|f'(x)|\leq 3$

then by MVT: $|f(a)-f(b)|\leq 3|a-b|$

$\forall$ all a and b

⑧ $[4,6]$; $-4\leq f'(x)\leq 3$: estimate $f(6)-f(4)$

$f'(x)\leq\frac{f(6)-f(4)}{6-4}\leq f'(x)=(-8,6)$

⑨ Points: $(0,20)$: $(1/6,35)$

$\frac{f(1/6)-f(0)}{1/6-0}=\frac{35-20}{1/6}=90\frac{mi}{hr^2}$