MATH 21 | EXAM 1 SOL'N | 28 SEPT 2007

PROB 1 (a) FALSE (b) FALSE (c) TRUE (d) TRUE

PROB 2

$$\lim_{x\to 1}\left(-\frac{x^2}{2}+2x+2\right) = -\frac{1}{2}+2+2 = \frac{7}{2}$$

$$\lim_{x\to 1}\left(x+\frac{5}{2}\right) = 1+\frac{5}{2} = \frac{7}{2}$$

SINCE $\left(-x^2/2+2x+2\right) \le g(x) \le (x+5)$, AND

BECAUSE $\lim_{x\to 1}\left(-x^2/2+2x+2\right) = \lim_{x\to 1}(x+5) = 7/2$

WE KNOW BY THE SQUEEZE TH'M THAT $\boxed{\lim_{x\to 1} g(x) = 7/2}$

PROB 3

(a) $$\lim_{x\to 2}\frac{x^2-4}{x-2} = \lim_{x\to 2}\frac{(x+2)(x-2)}{(x-2)} = \lim_{x\to 2}(x+2) = 2+2 = \boxed{4}$$

(b) NOTE $|x-2| = \begin{cases} (x-2), & x \ge 2 \\ -(x-2), & x < 2 \end{cases}$

THUS, $$\lim_{x\to 2^-}\frac{|x-2|}{(x-2)} = \lim_{x\to 2^-}\frac{-(x-2)}{(x-2)} = \lim_{x\to 2^-}(-1) = \boxed{-1}$$

PROB 4

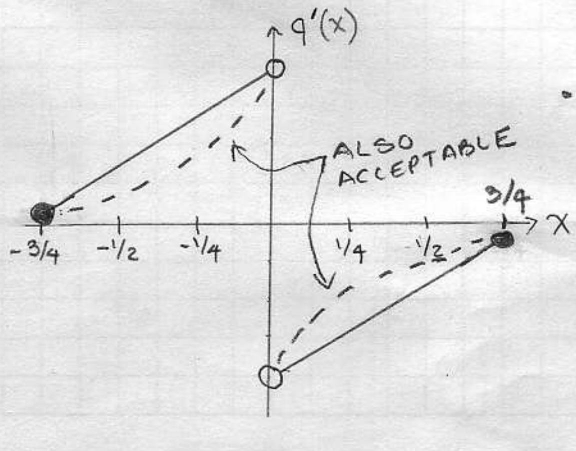
(a) $$\frac{dg}{dx} = \lim_{h\to 0}\frac{g(x+h)-g(x)}{h} = \lim_{h\to 0}\frac{1}{h}\left[\frac{1}{x+h+5}-\frac{1}{x+5}\right] = \lim_{h\to 0}\frac{1}{h}\left[\frac{x+5-(x+h+5)}{(x+h+5)(x+5)}\right]$$

$$= \lim_{h\to 0}\frac{1}{h}\left[\frac{-h}{(x+h+5)(x+5)}\right] = \lim_{h\to 0}\left[\frac{-1}{(x+h+5)(x+5)}\right] = \boxed{\frac{-1}{(x+5)^2}}$$

(b) $$\frac{dw}{dt} = \frac{d}{dt}\left[t^2+1+t^{-2}\right]\tan(t^2) + \left(t^2+1+t^{-2}\right)\frac{d}{dt}\tan(t^2)$$

$$= \boxed{\left(2t-2t^{-3}\right)\tan(t^2) + \left(t^2+1+t^{-2}\right)\sec^2(t^2)(2t)}$$

PROB 5



- q'(x) APPEARS NEAR ZERO AT $x = \pm 3/4$
- q(x) IS AN <u>EVEN</u> FUNC.; q'(x) IS AN <u>ODD</u> FUNC.