Test is on the way!!! Any last-minute questions???

Not much on 1.4, 1.5. Looking for functional limit-evaluation skills.

Let's plan on Test 1 being available from early this evening until Midnight, Wednesday night!

$$\lim_{h\to 0} \frac{\sqrt{x+h}-\sqrt{x}}{h} = \lim_{h\to 0}\frac{f(x+h)-f(x)}{h} :$$

$$\left(\frac{\sqrt{x+h}-\sqrt{x}}{h}\right)\left(\frac{\sqrt{x+h}+\sqrt{x}}{\sqrt{x+h}+\sqrt{x}}\right) = \frac{x+h-x}{h(\sqrt{x+h}+\sqrt{x})} = \frac{h}{h(\sqrt{x+h}+\sqrt{x})}$$

$$= \frac{1}{\sqrt{x+h}+\sqrt{x}} \xrightarrow{h\to 0} \frac{1}{\sqrt{x}+\sqrt{x}} = \boxed{\frac{1}{2\sqrt{x}} = \frac{d}{dx}\left[\sqrt{x}\right]}$$

<u>Power Rule Cheat</u>

$$\frac{d}{dx}\left[x^n\right] = nx^{n-1} \quad \text{(except for } n=0\text{)}$$

$$\frac{d}{dx}\left[x^0\right] = \frac{d}{dx}\left[\text{constant}\right] = \frac{d}{dx}\left[1\right] = 0$$

$$\sqrt[2]{x} = x^{\frac{1}{2}}$$

$$\frac{d}{dx}\left[x^{\frac{1}{2}}\right] = \frac{1}{2}x^{\frac{1}{2}-1} = \frac{1}{2}x^{-\frac{1}{2}} = \frac{1}{2\sqrt{x}}$$

$$\lim_{h\to 0}\frac{(x+h)^2-2(x+h)+7-x^2+2x-7}{h}$$

$$=\lim_{h\to 0}\frac{(x+h)^2-2(x+h)+7-(x^2-2x+7)}{h} = \lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$$

$(x+h)^2 = x^2+2hx+h^2$

where $f(x) = x^2-2x+7$

Hard way: $$\frac{x^2+2hx+h^2-2x-2h+7-x^2+2x-7}{h}$$

$$= \frac{2xh+h^2-2h}{h} = \frac{h(2x+h-2)}{h} = 2x+h-2 \quad (h\neq 0) \xrightarrow{h\to 0} \boxed{2x-2}$$

$$\frac{d}{dx}\left[x^2-2x+7\right] = \boxed{2x-2}$$