1. Evaluate the following limits without using L'Hôpital's Rule.

a. $\lim\limits_{x\to 2} \dfrac{x^3 - 3x^2 + 4}{\sqrt{x^3+8x} - \sqrt{5x^2+4}} = \lim\limits_{x\to 2} \left(\dfrac{x^3-3x^2+4}{(x^3+8x)-(5x^2+4)} \cdot \left(\sqrt{x^3+8x} + \sqrt{5x^2+4}\right)\right)$

$$= \lim_{x\to 2} \frac{x^3-3x^2+4}{x^3-5x^2+8x-4} \cdot \lim_{x\to 2}\left(\sqrt{x^3+8x}+\sqrt{5x^2+4}\right)$$

$$= \lim_{x\to 2} \frac{(x-2)^2\cdot(x+1)}{(x-2)^2\cdot(x-1)} \cdot \left(\sqrt{24}+\sqrt{24}\right)$$

$$= \lim_{x\to 2} \frac{x+1}{x-1} \cdot 4\sqrt{6}$$

$$= 3\cdot 4\sqrt{6} = 12\sqrt{6}$$

b. $\lim\limits_{x\to 0} \dfrac{\cos 8x - \cos 5x \cos 3x}{x^2} = \lim\limits_{x\to 0} \dfrac{\cos(5x+3x) - \cos 5x \cdot \cos 3x}{x^2}$

$$= \lim_{x\to 0} \frac{\cos 5x\cdot\cos 3x - \sin 5x\cdot\sin 3x - \cos 5x\cdot\cos 3x}{x^2}$$

$$= \lim_{x\to 0}\left(-5\cdot 3\cdot \underset{\downarrow \atop 1}{\frac{\sin 5x}{5x}} \cdot \underset{\downarrow \atop 1}{\frac{\sin 3x}{3x}}\right) = -5\cdot 3\cdot 1\cdot 1 = -15$$