CALCULUS

Limit problems

NEW

WARNING: In this homework, do NOT use l'Hôpital's rule. It has not been covered yet. Similarly, techniques of differentiation are unavailable.

NEW

0200-1. Suppose that $\lim_{t\to 3^-} u(t) = 8$,

$\lim_{t\to 3^-} v(t) = 9$ and $\lim_{t\to 3^-} w(t) = 64$.

a. Compute $\lim_{t\to 3^-} 3[u(t)] - 4[v(t)] + 5[w(t)]$.

b. Compute $\lim_{t\to 3^-} \dfrac{[u(t)]\sqrt[3]{w(t)}}{\sqrt{v(t)}}$.

NEW 0200-2. Using the properties of limits, and explaining each step, compute

$$\lim_{z\to 7}\left(\left[\frac{\sqrt[3]{z^2+15}}{2z-\sqrt{9+z}}\right]+2(z+1)^{2/3}-4\right).$$

NEW 0200-3. a. Compute $\lim_{w \to 2^-} \dfrac{w^2 - 6w + 8}{(w-4)^3}$.

b. Compute $\lim_{w \to 2^+} \dfrac{w^2 - 6w + 8}{(w-4)^3}$.

c. Compute $\lim_{w \to 2} \dfrac{w^2 - 6w + 8}{(w-4)^3}$.

NEW 0200-4. a. Compute $\lim_{w \to 4^-} \dfrac{w^2 - 6w + 8}{(w-4)^3}$.

Do NOT use l'Hôpital's rule.

b. Compute $\lim_{w \to 4^+} \dfrac{w^2 - 6w + 8}{(w-4)^3}$.

Do NOT use l'Hôpital's rule.

c. Compute $\lim_{w \to 4} \dfrac{w^2 - 6w + 8}{(w-4)^3}$.

Do NOT use l'Hôpital's rule.

NEW 0200-5. a. Compute $\lim_{u \to 4^-} \dfrac{u^2 - 2u - 8}{u - 4}$.

Do NOT use l'Hôpital's rule.

b. Compute $\lim_{u \to 4^+} \dfrac{u^2 - 2u - 8}{u - 4}$.

Do NOT use l'Hôpital's rule.

c. Compute $\lim_{u \to 4} \dfrac{u^2 - 2u - 8}{u - 4}$.

Do NOT use l'Hôpital's rule.

0200-6. NEW Compute $\lim_{t \to 5^-} \dfrac{(t-2)(t-4)(t-5)^7}{(t-5)^4}$.

Do NOT use l'Hôpital's rule.

0200-7. NEW Compute $\lim_{r \to 9^-} \dfrac{\sqrt{r+7}-5}{(r-9)^2}$.

Do NOT use l'Hôpital's rule.

0200-8. NEW Compute $\lim_{r \to 9^-} \dfrac{\sqrt{r+7}-4}{(r-9)^2}$.

Do NOT use l'Hôpital's rule.

NEW 0200-9. Compute $\lim_{h\to 0} \dfrac{(7+h)^5 - 7^5}{h}$.

Do NOT use l'Hôpital's rule.
Do NOT use differentiation.

NEW 0200-10. Compute $\lim_{h\to 0} \dfrac{(6+h)^{-2} - 6^{-2}}{h}$.

Do NOT use l'Hôpital's rule.
Do NOT use differentiation.

NEW 0200-11. Compute $\lim_{h\to 0} \dfrac{(4+h)^{-1/2} - 4^{-1/2}}{h}$.

Do NOT use l'Hôpital's rule.
Do NOT use differentiation.

0200-12 NEW. Using the Squeeze Theorem,

show that $\lim_{x \to 0} \left[x^2 + 2x^4\right] \left[\cos\left(\frac{2}{3x}\right)\right] = 0.$

0200-13 NEW. a. Compute $\lim_{x \to -2^+} \frac{x^2 - 4}{|x + 2|}.$

b. Compute $\lim_{x \to -2^-} \frac{x^2 - 4}{|x + 2|}.$

c. Compute $\lim_{x \to -2} \frac{x^2 - 4}{|x + 2|}.$

0200-14. NEW Let $f(a) = \dfrac{-2 + \sqrt{4 - 4a}}{2a}$.

By the Quadratic Equation, we see that

$x = f(a)$ is a solution to $ax^2 + 2x + 1 = 0$.

a. Compute $L := \lim_{a \to 0} f(a)$. Do NOT use l'Hôpital's rule.

b. Show that $x = L$ is the sol'n to $2x + 1 = 0$.