1. (1 pt) Let f, g, h, k, u, and v be functions such that:

$\lim_{x\to -3} f(x) = 0$ $\lim_{x\to -3} g(x) = 0$ $\lim_{x\to -3} h(x) = 1$

$\lim_{x\to -3} k(x) = 4$ $\lim_{x\to -3} u(x) = \infty$ $\lim_{x\to -3} v(x) = \infty$

For each of the following forms determine whether the following limit type is indeterminate, always has a fixed finite value, always is infinite, or never has a fixed finite or infinite value. In the first case answer IND, in the second case enter the numerical value, in the third case answer INF, and in the fourth case answer DNE. For example

$\frac{0}{0}$ ·	$\frac{0}{1}$ ·	$\frac{1}{0^+}$ ·	$\frac{1}{0}$ ·
IND	0	INF	DNE

To discourage blind guessing, this problem is graded on the following scale
0-9 correct = 0
10-13 correct = .3
14-16 correct = .5
17-19 correct = .7
Note that l'Hospital's rule (in some form) may ONLY be applied to indeterminate forms.

___1. $\lim_{x\to -3} \frac{f(x)}{v(x)}$
___2. $\lim_{x\to -3} h(x)^{-v(x)}$
___3. $\lim_{x\to -3} (u(x) - v(x))$
___4. $\lim_{x\to -3} 4^{u(x)}$
___5. $\lim_{x\to -3} u(x)^{-4}$
___6. $\lim_{x\to -3} h(x) \cdot v(x)$
___7. $\lim_{x\to -3} g(x)^{-u(x)}$
___8. $\lim_{x\to -3} h(x)^{u(x)}$
___9. $\lim_{x\to -3} h(x)^{g(x)}$
___10. $\lim_{x\to -3} u(x)^{-v(x)}$
___11. $\lim_{x\to -3} u(x)^{f(x)}$
___12. $\lim_{x\to -3} \frac{h(x)}{-v(x)}$
___13. $\lim_{x\to -3} (u(x) \cdot v(x))$
___14. $\lim_{x\to -3} f(x)^{v(x)}$
___15. $\lim_{x\to -3} g(x) \cdot u(x)$
___16. $\lim_{x\to -3} \frac{u(x)}{f(x)}$
___17. $\lim_{x\to -3} g(x)^{f(x)}$
___18. $\lim_{x\to -3} v(x)^{u(x)}$
___19. $\lim_{x\to -3} v(x)^{h(x)}$
___20. $\lim_{x\to -3} 4^{-u(x)}$

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2. (1 pt)
Evaluate the limit using L'Hospital's rule

$$\lim_{x\to 0} \frac{e^{15x} - 1}{\sin(7x)}$$

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3. (1 pt) Compute the following limit using l'Hopital's rule if appropriate. Use INF to denote ∞ and MINF to denote $-\infty$.

$\lim_{x\to 0^+} 4\sin(x)\ln(x) =$ _____

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4. (1 pt) Find the following limits, using l'Hospital's rule if appropriate

$\lim_{x\to\infty} \frac{\arctan(x^2)}{x^8} =$ _____

$\lim_{x\to 0^+} \sqrt[8]{x}\ln(x) =$ _____

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5. (1 pt)
Evaluate the limit using L'Hospital's rule if necessary

$$\lim_{x\to\infty} (9x)^{\frac{\ln 9+1}{\ln(2x)+1}}$$

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6. (1 pt)
Evaluate the limit using L'Hospital's rule if necessary

$$\lim_{x\to\infty} \left(\frac{16x}{16x+6}\right)^{8x}$$

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