Math 261 – Summer Lab 3 **Limit Properties** Name_____

Show all work for credit. Also, give exact answers unless otherwise noted.

1. Given $\lim_{x\to 2} f(x) = 4$, $\lim_{x\to 2} g(x) = -6$, $\lim_{x\to 2} h(x) = 0$, and $\lim_{x\to 2} k(x) = \infty$, find each of the following.

   Caution: For some of the solutions where the form of the function may result in different solutions, state each solution with conditions.

   (a) $\lim_{x\to 2}(f-g)(x)$

   (b) $\lim_{x\to 2} \dfrac{1}{|4-f(x)|}$

   (c) $\lim_{x\to 2}(fg)(x)$

   (d) $\lim_{x\to 2}\left[5g(x)+3x^2\right]$

   (e) $\lim_{x\to 2}\sqrt{h(x)}$

   (f) $\lim_{x\to 2} 3x^3 g(x)$

   (g) $\lim_{x\to 2}\left[x^2+3x-2f(x)\right]$

   (h) $\lim_{x\to 2} \dfrac{2f(x)}{3-\sqrt{10+g(x)}}$

   (i) $\lim_{x\to 2} \dfrac{g(x)}{x+k(x)}$

   (j) $\lim_{x\to 2} \dfrac{g(x)+3}{h(x)}$

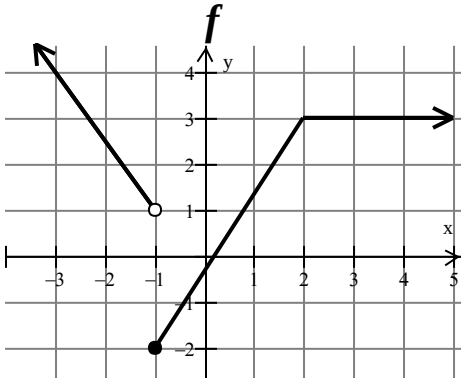
   (k) $\lim_{x\to 2} \dfrac{h(x)}{k(x)}$

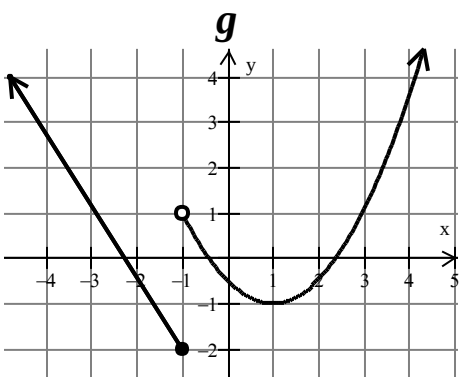
   (l) $\lim_{x\to 2} \dfrac{7+\left[f(x)\right]^2}{x-f(x)\cdot g(x)}$

   (m) $\lim_{x\to 2} \dfrac{5k(x)}{f(x)+g(x)}$

   (n) $\lim_{x\to 2} \dfrac{3h(x)-k(x)}{f(x)\cdot g(x)}$

2. Use the graphs to determine each limit.





(a) $\lim_{x\to -1^-}(f+g)(x)$ (b) $\lim_{x\to -1^+}(f+g)(x)$ (c) $\lim_{x\to -1}(f+g)(x)$

(d) $(f+g)(-1)$ (e) $\lim_{x\to 1}\dfrac{f(x)}{g(x)}$ (f) $\left(\dfrac{f}{g}\right)(1)$

(g) $\lim_{x\to 3}(f\circ g)(x)$ (h) $(f\circ g)(3)$ (i) $\lim_{x\to 4}(g\circ f)(x)$

(j) $\lim_{x\to -3}(f\circ g)(x)$ (k) $(f\circ g)(-3)$ (l) $(g\circ f)(4)$

3. For each of the following, find the limit if it exists.
If the limit does not exist, write *DNE*, ∞, or $-\infty$ whichever is appropriate.

(a) $\lim_{x\to 8} 7$ (b) $\lim_{w\to 4}\dfrac{w^2-6w+5}{w^2-9}$ (c) $\lim_{\theta\to 0}\sin\theta$

(d) $\lim_{v\to 9}\dfrac{v-9}{\sqrt{v}-3}$

(e) $\lim_{p\to -7}\dfrac{\sqrt{p+7}}{p+4}$

(f) $\lim_{t\to -2}\dfrac{t^4-16}{t+2}$

(g) $\lim_{m\to 5}\dfrac{\frac{1}{m}-\frac{1}{5}}{m-5}$

(h) $\lim_{h\to 0}\dfrac{(x+h)^3-x^3}{h}$

(i) $\lim_{x\to -4^-}\dfrac{2}{x^2+4x}$

(j) $\lim_{x\to 1^+}\dfrac{4x}{x^2-4x+3}$

(k) $\lim_{x\to \frac{\pi}{2}^+}\tan x$

(l) $\lim_{x\to 2} f(x)$ where $f(x)=\begin{cases} -x+3 & \text{if } x<2 \\ 3 & \text{if } x=2 \\ -x^2+6x-3 & \text{if } x>2 \end{cases}$

(m) $\lim_{x\to\infty}\dfrac{5x^3-7x+1}{4x^3-8}$

(n) $\lim_{x\to -\infty}\dfrac{9x^3-4x^2-5x+1}{4-x^2}$

(o) $\lim_{x\to\infty}\dfrac{2x^3-4x^2+1}{5x^5-8x}$