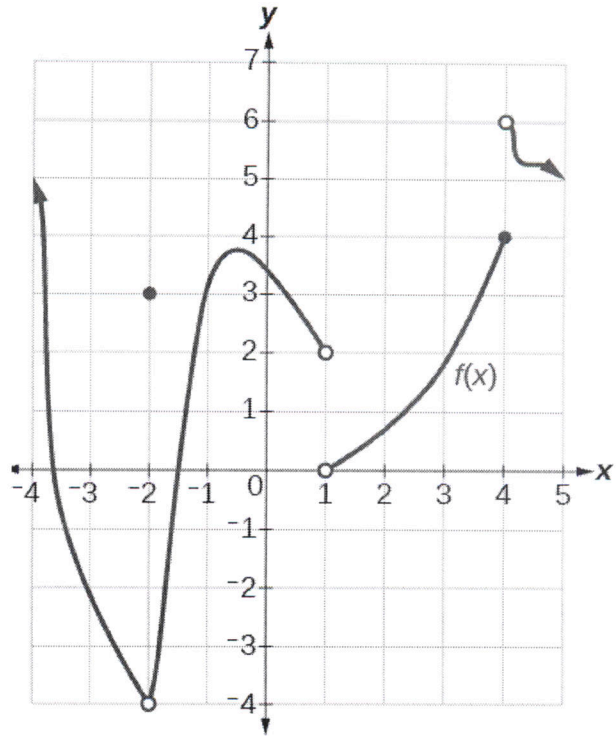


$$g(x) = \begin{cases} 4x & x < -2 \\ -8 & -2 \leq x < 5 \\ x^2 & x \geq 5 \end{cases}$$



Given $h(x) = f(x)g(x)$ and $k(x) = g(f(x))$, find each of the following:

a) $\lim_{x \rightarrow -2} h(x)$

$$\begin{aligned} &= \lim_{x \rightarrow -2} f(x)g(x) \\ &= \lim_{x \rightarrow -2} f(x) \cdot \lim_{x \rightarrow -2} g(x) \\ &= -4 \cdot -8 \\ &= \boxed{32} \end{aligned}$$

e) $\lim_{x \rightarrow 1} h(x)$

$$\begin{aligned} &= \lim_{x \rightarrow 1} f(x)g(x) \\ &= \lim_{x \rightarrow 1} f(x) \cdot \lim_{x \rightarrow 1} g(x) \\ &= \text{DNE} \end{aligned}$$

b/c $\lim_{x \rightarrow 1} f(x) \neq \lim_{x \rightarrow 1} g(x)$
 $\lim_{x \rightarrow 1} f(x) \neq \lim_{x \rightarrow 1} f(x)$
 $2 \neq 0$

i) $\lim_{x \rightarrow 0} h(x)$

$$\begin{aligned} &= \lim_{x \rightarrow 0} f(x)g(x) \\ &= \lim_{x \rightarrow 0} f(x) \cdot \lim_{x \rightarrow 0} g(x) \\ &= (3.5)(-8) \\ &= \boxed{-28} \end{aligned}$$

estimate...

m) $\lim_{x \rightarrow 4} h(x)$

$$\begin{aligned} &= \lim_{x \rightarrow 4} f(x)g(x) \\ &= \lim_{x \rightarrow 4} f(x) \cdot \lim_{x \rightarrow 4} g(x) \\ &= \text{DNE} \end{aligned}$$

b/c $\lim_{x \rightarrow 4} f(x) \neq \lim_{x \rightarrow 4} g(x)$
 $4 \neq 6$

b) $\lim_{x \rightarrow -2} k(x)$

$$\begin{aligned} &= \lim_{x \rightarrow -2} g(f(x)) \\ &= g(\lim_{x \rightarrow -2} f(x)) \\ &= g(-4) \\ &= \boxed{-16} \end{aligned}$$

f) $\lim_{x \rightarrow 1} k(x)$

$$\begin{aligned} &= \lim_{x \rightarrow 1} g(f(x)) \\ &= g(\lim_{x \rightarrow 1} f(x)) \\ &= \text{DNE} \end{aligned}$$

b/c $\lim_{x \rightarrow 1} f(x) \text{ DNE}$,
 $\lim_{x \rightarrow 1} f(x) \neq \lim_{x \rightarrow 1} f(x)$
 $2 \neq 0$

j) $\lim_{x \rightarrow 0} k(x)$

$$\begin{aligned} &= \lim_{x \rightarrow 0} g(f(x)) \\ &= g(\lim_{x \rightarrow 0} f(x)) \\ &= g(3.5) \\ &= \boxed{-8} \end{aligned}$$

n) $\lim_{x \rightarrow 4} k(x)$

$$\begin{aligned} &= \lim_{x \rightarrow 4} g(f(x)) \\ &= g(\lim_{x \rightarrow 4} f(x)) \\ &= \text{DNE} \end{aligned}$$

b/c $\lim_{x \rightarrow 4} f(x) \neq \lim_{x \rightarrow 4} f(x)$
 $4 \neq 6$

c) $h(-2)$

$$\begin{aligned} h(-2) &= f(-2)g(-2) \\ &= 3 \cdot -8 \\ &= \boxed{-24} \end{aligned}$$

g) $h(1)$

$$\begin{aligned} h(1) &= f(1)g(1) \\ &= \text{DNE} \end{aligned}$$

b/c $f(1) \text{ DNE}$
 no pt @ $x=1$

k) $h(0)$

$$\begin{aligned} h(0) &= f(0)g(0) \\ &= (3.5)(-8) \\ &= \boxed{-28} \end{aligned}$$

o) $h(4)$

$$\begin{aligned} h(4) &= f(4)g(4) \\ &= 4 \cdot -8 \\ &= \boxed{-32} \end{aligned}$$

d) $k(-2)$

$$\begin{aligned} k(-2) &= g(f(-2)) \\ &= g(3) \\ &= \boxed{-8} \end{aligned}$$

h) $k(1)$

$$\begin{aligned} k(1) &= g(f(1)) \\ &= \text{DNE} \end{aligned}$$

b/c $f(1) \text{ DNE}$

l) $k(0)$

$$\begin{aligned} k(0) &= g(f(0)) \\ &= g(3.5) \\ &= \boxed{-8} \end{aligned}$$

p) $k(4)$

$$\begin{aligned} k(4) &= g(f(4)) \\ &= g(4) \\ &= \boxed{-8} \end{aligned}$$