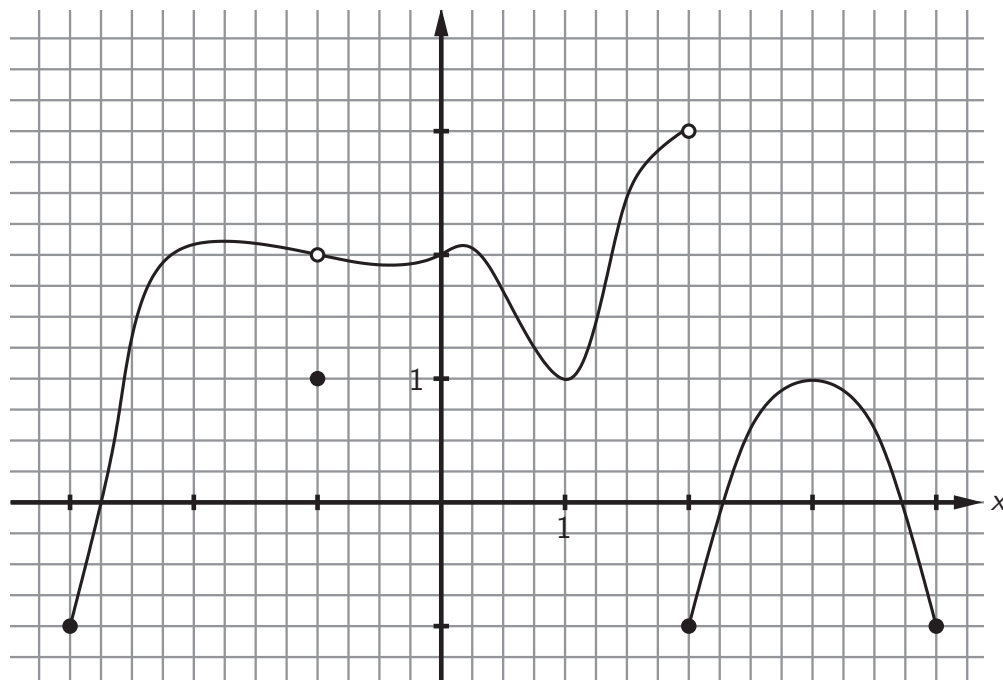


Question 1: For this question use the graph of $y = f(x)$ below:



(a)[2] What is $(f \circ f)(-3)$?

(b)[1] State the range of $f(x)$ using interval notation.

(c)[1] State the domain of $f(x)$ using interval notation.

(d)[2] Determine $\lim_{x \rightarrow 2} f(x)$.

(e)[2] What is $\lim_{x \rightarrow 2^-} f(x)$?

(f)[2] Determine $\lim_{x \rightarrow -1} f(x)$.

Question 2: For this question use the functions $f(x) = \frac{1}{x-1}$ and $g(x) = \sqrt{x-4}$.

(a)[3] Determine $(f + g)(x)$ and state the domain using interval notation.

(b)[3] Determine $(f \circ g)(x)$ and state the domain using interval notation.

(c)[4] Compute and simplify the difference quotient $\frac{f(x+h) - f(x)}{h}$.

Question 3: Evaluate the following limits, if they exist:

(a)[3] $\lim_{x \rightarrow 3} \frac{x^2 - x - 6}{x^2 + 5x - 24}$

(b)[4] $\lim_{x \rightarrow 2^-} \left(\frac{1}{x-2} + \frac{1}{|x-2|} \right)$

(c)[3] $\lim_{x \rightarrow 7^-} \frac{x - \sqrt{7-x}}{7+x}$

Question 4: Evaluate the following limits, if they exist:

(a)[5] $\lim_{x \rightarrow -3} \frac{\left[\frac{1}{3} + \frac{1}{x} \right]}{3 + x}$

(b)[5] $\lim_{x \rightarrow 5} \frac{5 - \sqrt{20 + x}}{x - 5}$

Question 5:

(a)[3] Evaluate the following limit if it exists: $\lim_{\theta \rightarrow 0} \frac{\sin(3\theta)}{9\theta^2}$

(b)[3] Evaluate the following limit if it exists: $\lim_{x \rightarrow 0} \frac{\sin(7x)}{\sin(2x) \cos(3x)}$

(c)[4] Suppose $f(x)$ is a function with the property that $-3 \leq f(x) \leq 2$ for every real number x . Determine $\lim_{x \rightarrow 0} x^4 f(x)$. (State any theorems used, like the Squeeze Theorem, for example, and be sure to state the conditions necessary to justify use of the theorem.)