Composite Limits

$$f(x) = 2x + 1 \qquad g(x) = 1/x \qquad (f \circ g)(x)$$

$$f[g(x)]$$

$$=$$

$$\frac{2}{1}\left(\frac{1}{x}\right) + 1$$

$$=$$

$$\boxed{\lim_{x \to 1} \quad \frac{2}{x} + 1}$$

$$=$$

$$\frac{2}{x} + \frac{1}{1}$$

$$=$$

$$\frac{2 + 1}{x}$$

$$=$$

$$\lim_{x \to 1} \frac{3}{x}$$

$$=$$

$$\frac{\lim_{x \to 1} 3}{\lim_{x \to 1} x}$$

$$\frac{3}{1}$$

$$\boxed{3}$$

$$f(x) = x - 1 \qquad\qquad g(x) = x^2$$

$$\lim_{x \to 1} (f \circ g)(x) \qquad\qquad f(g(x))$$

$$\lim_{x \to 1} x^2 - 1$$

$$=$$

$$\lim_{x \to 1} x^2 \quad + \quad \lim_{x \to 1} 1$$

$$=$$

$$\left[\lim_{x \to 1} x \right]^2 \quad - \quad 1$$

$$=$$

$$(1)^2 \quad - \quad 1$$

$$=$$

$$0$$