7. $f(x) = x+3 \quad g(x) = x^2 - 1$

a) $\lim_{x \to 2} f(x) = 2+3 = 5$

b) $\lim_{x \to 3} g(x) = 3^2 - 1 = 8$

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

$= \lim_{x \to 2} [(x+3)^2 - 1]$

$= (2+3)^2 - 1$

$= 5^2 - 1$

$= 25 - 1$

$= 24$

NOTE: $\lim_{x \to c} g(x) = L$

THEN

$\lim_{x \to c} f(g(x)) = f(L)$

8. $\lim_{x \to c} f(x) = 8$

$\lim_{x \to c} g(x) = 4$

a) $\lim_{x \to c} [5 f(x)]$

$= 5 \lim_{x \to c} f(x)$

$= 5(8)$

$= 40$

b) $\lim_{x \to c} [f(x) + g(x)]$

$= \lim_{x \to c} f(x) + \lim_{x \to c} g(x)$

$= 8 + 4$

$= 12$

c) $\lim_{x \to c} [f(x) g(x)]$

$= \left[\lim_{x \to c} f(x)\right] \left[\lim_{x \to c} g(x)\right]$

$= (8)(4)$

$= 32$

d) $\lim_{x \to c} \frac{f(x)}{g(x)}$

$= \frac{\lim_{x \to c} f(x)}{\lim_{x \to c} g(x)}$

$= \frac{8}{4}$

$= 2$

9. $f(x) = \frac{x}{x^2 - 2x}$

a) $\lim_{x \to 3} f(x)$

$= \lim_{x \to 3} \frac{x}{x^2 - 2x}$

$= \frac{3}{3^2 - 2(3)}$

$= \frac{3}{9-6}$

$= \frac{3}{3}$

$= 1$

"FACTOR / CANCEL METHOD"

b) $\lim_{x \to 0} f(x)$

$= \lim_{x \to 0} \frac{x}{x^2 - 2x}$ (GCF)

$= \lim_{x \to 0} \frac{\cancel{x}}{\cancel{x}(x-2)}$

$= \lim_{x \to 0} \frac{1}{x-2}$

$= \frac{1}{0-2} = -\frac{1}{2}$

① FACTOR TOP, FACTOR BOTTOM

② CANCEL IF POSSIBLE

③ NOW DO DIRECT SUBSTITUTION