CALCULUS 1510 – TUTORIAL #1 SOLUTIONS

(1) (a) $\lim_{x\to 3^+} \frac{x+3}{\sqrt{x-3}} = \frac{"6"}{0^+} = \infty$

(b) $\lim_{x\to 1} \frac{3-\sqrt{6x+3}}{x-1} \cdot \frac{3+\sqrt{6x+3}}{3+\sqrt{6x+3}} = \lim_{x\to 1} \frac{9-(6x+3)}{(x-1)\left[3+\sqrt{6x+3}\right]}$

$= \lim_{x\to 1} \frac{-6(x-1)}{(x-1)\left[3+\sqrt{6x+3}\right]} = \lim_{x\to 1} \frac{-6}{3+\sqrt{6x+3}} = \frac{-6}{3+3} = -1$

(c) $\lim_{x\to 0} \frac{\sin 4x}{\sin 2x} = \lim_{x\to 0} \frac{2\sin 2x \cdot \cos 2x}{\sin 2x} = \lim_{x\to 0} 2\cos 2x = 2(1) = 2$

(d) $\lim_{x\to 3} \frac{x^3-27}{x^2+2x-15} = \lim_{x\to 3} \frac{(x-3)(x^2+3x+9)}{(x+5)(x-3)}$

$= \lim_{x\to 3} \frac{x^2+3x+9}{x+5} = \frac{27}{8}$

(e) $\lim_{x\to 0} \frac{\sqrt{1-x}-\sqrt{1+x}}{x} \cdot \frac{\sqrt{1-x}+\sqrt{1+x}}{\sqrt{1-x}+\sqrt{1+x}} = \lim_{x\to 0} \frac{(1-x)-(1+x)}{x}$

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

(f) $\lim_{x\to 3^-} \frac{x^3-3x^2}{|x-3|} = \lim_{x\to 3^-} \frac{x^2(x-3)}{-(x-3)} = \lim_{x\to 3^-} (-x^2) = -9$

(2.) $\lim_{x\to 3} f(x) = 0$ otherwise $\lim_{x\to 3} \frac{f(x)}{g(x)} = \pm\infty$ when

$\lim_{x\to 3} f(x) \neq 0$ and $\lim_{x\to 3} g(x) = 0$.