Name:
Stu#: SOLUTIONS.

(1) [15 points] Use the definition of the derivative to find an equation of the tangent line to $y = \dfrac{3}{x+2}$ at the point $(-5, -1)$.

$$f(x) = \frac{3}{x+2}$$

$$f'(-5) = \lim_{h\to 0} \frac{f(-5+h) - f(-5)}{h}$$

$$= \lim_{h\to 0} \frac{1}{h}\left[\frac{3}{-5+h+2} - \frac{3}{-5+2}\right]$$

$$= \lim_{h\to 0} \frac{1}{h}\left[\frac{3}{-3+h} + 1\right]$$

$$= \lim_{h\to 0} \frac{1}{h}\left[\frac{3+(-3+h)}{-3+h}\right]$$

$$= \frac{-1}{3}$$

$\therefore\ y - y_0 = m(x - x_0)$

$$\boxed{y+1 = \frac{-1}{3}(x+5)}$$