1. Solve the following inequalities:

(a) $3 - |2x + 4| \geq 1$

$-|2x + 4| \geq -2$

$|2x + 4| \leq 2$

↑
SWITCH!

$-2 \leq 2x + 4 \leq 2$

$-1 \leq x + 2 \leq 1$

$-3 \leq x \leq -1$

(b) $\dfrac{x}{x+1} > 3x$

→ undefined : $x + 1 = 0$ or $x = -1$

$\dfrac{x}{x+1} - 3x > 0$

$\dfrac{x - 3x(x+1)}{x+1} > 0$

$\dfrac{x - 3x^2 - 3x}{x+1} > 0$

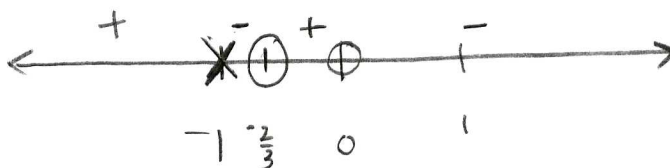$\dfrac{-3x^2 - 2x}{x+1} > 0$

$\dfrac{3x^2 + 2x}{x+1} < 0$

↑
Switch!

Zeros: $3x^2 + 2x = 0$

$x(3x + 2) = 0$

$x = 0 \qquad x = -\tfrac{2}{3}$

Test points: to see if $\dfrac{3x^2 + 2x}{x+1} < 0$

OR test to see if $\dfrac{x}{x+1} - 3x > 0$

$x = -2 : \quad \dfrac{-2}{-2+1} - 3(-2) = \dfrac{-2}{-1} + 6 = 8 > 0$

$x = -\dfrac{5}{6} : \quad \dfrac{-\frac{5}{6}}{-\frac{5}{6}+1} - 3\left(-\dfrac{5}{6}\right) = \dfrac{-\frac{5}{6}}{\frac{1}{6}} + \dfrac{15}{6} = -5 + \dfrac{5}{2} = \dfrac{-5}{2} < 0$

$x = -\dfrac{1}{3} : \quad \dfrac{-\frac{1}{3}}{-\frac{1}{3}+1} - 3\left(-\dfrac{1}{3}\right) = \dfrac{-\frac{1}{3}}{\frac{2}{3}} + 1 = -\dfrac{1}{2} + 1 = \dfrac{1}{2} > 0$

$x = 1 : 1 \quad \dfrac{1}{1+1} - 3(1) = \dfrac{1}{2} - 3 = -2.5 < 0$

ANSWER: $(-\infty, -1) \cup (-\tfrac{2}{3}, 0)$