Limits as x approaches 0:

$$\lim_{x\to 0} \frac{2x^2+3x}{12x}$$

For limits as x approaches zero, there are a few methods. If one of them gets you an answer of "undefined," go through all of the methods before you take that as your answer.

The first method is to plug in zero for every x and simplify.

If you plug in zero to the limit and solve and the numerator is a positive value and the denominator is zero, the limit is positive infinity.

If you plug in zero and the numerator is a negative value and the denominator is zero, the limit is negative infinity.

If you plug in zero and you end up with either $\frac{0}{0}$ or $\frac{\infty}{\infty}$ you need to use L'hopital's rule. Basically you take the derivatives of the top and bottom of the function, then plug in zero again.

REMINDER: Derivatives ---

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

"F prime of x"

Example:

$$\frac{2x^2+3x}{12x} = \frac{2(0)^2+3(0)}{12(0)} = \frac{0}{0} \cdots$$

$$\frac{\frac{2(x+h)^2+3(x+h)-2x^2-3x}{h}}{\frac{12(x+h)-12x}{h}} = \frac{\frac{2x^2+4xh+2h^2+3x+3h-2x^2-3x}{h}}{\frac{12x+12h-12x}{h}} = \frac{4xh+2h^2+3h}{12h} = \frac{2h+4x+3}{12}$$

The h is approaching zero, so the 2h turns into zero.

$$\frac{4x+3}{12}$$

Replace the x's with zeros. $\frac{4(0)+3}{12} = \frac{3}{12} = \frac{1}{4}$