**5.6 Rates of Change in Rational Functions**

**Example 1:**

a) Estimate the slope of the tangent to the graph of $f\left(x\right)= \frac{2x}{x+4}$ at the point $x=-2$.

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| DIFFERENCE QUOTIENT | AVERAGE RATE OF CHANGE WITH TINY INTERVAL |
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b) Why can't there be a tangent line at $x= -4$?

**Now you try:**

1. Estimate the slope of the tangent line to the graph of f(x) at x= -5 where $f\left(x\right)=\frac{x}{x+3}$
2. Estimate the rate of change of f(x) at the point (2,-1) where $f\left(x\right)=\frac{x}{x-4}$
3. When polluted water begins to flow into an unpolluted pond, the concentration of pollutant, c, in the pond at t minutes is modelled by $c\left(t\right)= \frac{32t}{10000+4t}$

where c is measured in kilograms per cubic metre. Determine the rate at which the concentration is changing after

a) 1 hour b) one week

c) Sketch the graph to see if your answers for a) and b) are reasonable.

1. Suppose that the number of houses in a new subdivision after t months of development is modelled by $N\left(t\right)= \frac{1000t^{3}}{500+t^{3}}$

where N is the number of houses and 0≤t≤12.

a) Calculate the average rate of change in the number of houses built over the first 6 months (0 - 6).

b) Calculate the instantaneous rate of change in the number of houses built at the end of the first year.

(Since the rational function has exponents you can use the average rate of change formula with a small interval)

**Homework: pg 303-305 #4, 5, 6,7,10**