# MAC2311 Class Number 15534
# QUIZ 3
# 1/31/2019

METHOD 2: DEGREE OF NUMERATOR IS 1 (SINCE $\sqrt{x^2} = |x|$) AND THE DEGREE OF THE DENOMINATOR IS 1, SO THE LIMIT IS THE RATIO OF LEADING COEFFICIENTS

Name: SOLUTIONS

1. Find the limit: $\lim_{x\to\infty} \dfrac{\sqrt{25x^2-11}+1}{x+7}$

* $\sqrt{x^2} = |x|$

$$\lim_{x\to\infty} \frac{\sqrt{25x^2-11}/\sqrt{x^2} + 1/|x|}{x/|x| + 7/|x|} = \lim_{x\to\infty} \frac{\sqrt{\frac{25x^2}{x^2} - \frac{11}{x^2}} + 0}{1+0} = \lim_{x\to\infty} \frac{\sqrt{25}}{1} = \frac{5}{1} = \boxed{5}$$

2. Find the average velocity of $s(t) = t^2 - 6t$ from $t = 2$ to $t = 2+h$

$$s(t) = \frac{s(2+h) - s(2)}{2+h-2} = \frac{(2+h)^2 - 6(2+h) - (2^2 - 6(2))}{h}$$

$$= \frac{4+4h+h^2 - 12 - 6h - (-8)}{h} = \frac{-2h+h^2}{h} = \frac{h(-2+h)}{h}$$

$$= \boxed{-2+h}$$

3. Compute the limit: $\lim_{x\to -1} \dfrac{-3 - \frac{3}{x}}{x+1}$

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

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