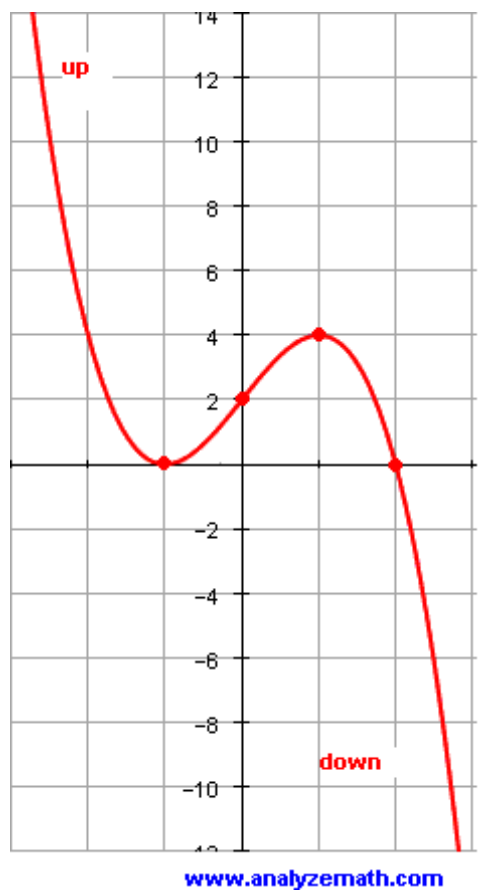# Math 100 Sample Test 2 – Oct 2018

Question 1 Find an equation for the normal line to the graph of $f(x) = \frac{x}{x+1}$ at the $x = 0$. Prove that this normal line intersects the graph of $f(x)$ twice.

Question 2 Let $f(x) = \frac{a^2+x}{a^2-x}$, where a is a constant. Compute $f''(-a)$.

Question 3):

[] Use the graph of $f'(x)$ to sketch the graph of $f(x)$ and $f''(x)$.

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Question 4:

Differentiate

$$(1) \quad f(t) = \sec^3(t^2)$$

$$(2) \quad f(x) = \tan(2x) - \cot(3x)$$

(3) $f(x) = \sqrt{\dfrac{1 - \cos^3 x}{1 + \sin x}}$

(4) $f(x) = |3 - \sqrt[3]{1 - x}|$

(5) $f(x) = x \cos(1/x^2)$

(6) $f(x) = (1 - 3x)^3 (3x - 4)^2$.

Question 5 Let $h(x) = f(x^3)$, $g(x) = xf^3(x)$, $f(0) = 4$, $f'(0) = -2$. Compute $h'(0)$ *and* $g'(0)$.

Question 6 :

Use the definition of the derivative to compute

$$\lim_{x \to 1} \frac{x^7 - 1}{x - 1}.$$

Question 7 : Let $f(\mu) = \frac{\lambda \mu^2}{1 - K\mu}$. Compute $\frac{df}{d\mu}\big|_{\mu=0}$.

Question 8

Bob is a first-year Calculus student at UBC. He has decided that the following function

$$f(x) = 1 - \sqrt[3]{(1-x)^2}$$

is differentiable at any point. Is he right? Explain.