Answer and mark clearly the questions in the provided answer sheets. Write down your name and student's ID on the each answer sheet you used. * Note: No points will be given if no arguments are provided for an answer. Good Luck! $\sim \sim$ Yuling $\ddot{\sim}$

1. (10 points) Find the equation of the tangent line to the graph of $f(x)=\sqrt[3]{\frac{x}{x+2}}$ at $x=-1$.
2. (10 points) Find $h^{\prime}(0)$ if $h(x)=\sqrt{5 x^{2}+g(x)}$, where $g(0)=4$ and $g^{\prime}(0)=2$.
3. (10 points) Find all points (both coordinates) on the curve $x^{2}+x y+y^{2}=3$ where the tangent line is (a) horizontal and (b) vertical.
4. (10 points) Find $\frac{d^{2} y}{d x^{2}}$, where $x^{2}+3 y^{2}=5$.
5. Determine the critical numbers of the given function and classify each critical point as a relative maximum, a relative minimum, or neither.
(a) (10 points) $h(t)=\frac{t^{2}}{t^{2}+t-2}$.
(b) (10 points) $f(x)$ with $f^{\prime}(x)=\frac{(x+1)^{2}(4-3 x)^{3}}{\left(x^{2}+1\right)^{2}}$.
(c) (10 points) $f(x)=\frac{(x-2)^{3}}{x^{2}}$.
6. (10 points) Determine where the graph of $f(x)=x(2 x+1)^{2}$ is concave upward and concave downward. Find the coordinates of all inflection points.
7. Find the absolute maximum and absolute minimum (if any) of the given function on the specified interval.
(a) (10 points) $f(t)=3 t^{5}-5 t^{3} ;-2 \leq t \leq 0$.
(b) (10 points) $f(x)=\frac{1}{x} ; x>0$.
