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

- 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'(0) if $h(x) = \sqrt{5x^2 + g(x)}$, where g(0) = 4 and g'(0) = 2.
- 3. (10 points) Find all points (both coordinates) on the curve $x^2 + xy + y^2 = 3$ where the tangent line is (a) horizontal and (b) vertical.
- 4. (10 points) Find $\frac{d^2y}{dx^2}$, where $x^2 + 3y^2 = 5$.
- 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 $f'(x) = \frac{(x+1)^2(4-3x)^3}{(x^2+1)^2}$.
 - (c) (10 points) $f(x) = \frac{(x-2)^3}{x^2}$.
- 6. (10 points) Determine where the graph of $f(x) = x(2x + 1)^2$ 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) $f(t) = 3t^5 5t^3; -2 \le t \le 0.$
 - (b) (10 points) $f(x) = \frac{1}{x}; x > 0.$