

## WRITTEN ASSIGNMENT #2 - SOLUTION

1. The position of an object after  $t$  seconds is  $s(t) = t^3 + t$  meters.

- (a) (2 points) What is the average velocity of the object between 3 seconds and 5 seconds? Include units!

**Solution:**

$$\text{avg. velocity} = \frac{s(5) - s(3)}{5 - 3} = \frac{(5^3 + 5) - (3^3 + 3)}{2} = \frac{125 + 5 - 27 - 3}{2} = \frac{100}{2} = \boxed{50 \text{ m/s}}$$

- (b) (2 points) As a function of  $x$ , what is the average velocity of the object between  $x$  seconds and  $x + 1$  seconds? Include units!

**Solution:** Let  $v(x)$  be the function of  $x$  that represent the average velocity of the object between  $x$  seconds and  $x + 1$  second, with the formula

$$\begin{aligned} v(x) &= \frac{s(x+1) - s(x)}{(x+1) - x} = \frac{((x+1)^3 + (x+1)) - (x^3 + x)}{1} \\ &= x^3 + 3x^2 + 3x + 1 + x + 1 - x^3 - x = \boxed{3x^2 + 3x + 2 \text{ m/s}} \end{aligned}$$

2. (4 points) Sketch the graph of an example of a function  $f$  that satisfies all of the following conditions:

$$\begin{array}{lll} \text{Range} = [-2, 5] & \lim_{x \rightarrow 0^-} f(x) = 2, & \lim_{x \rightarrow 0^+} f(x) = 0, & \lim_{x \rightarrow 4^-} f(x) = 3, \\ \lim_{x \rightarrow 4^+} f(x) = 0, & f(0) = 2, & f(4) = 1. \end{array}$$

**Solution:**

