

Name: Solutions

Directions: Show all work. No credit for answers without work.

1. [4 parts, 1 point each] The weight,  $W$  (in lbs), if a child is a function the time  $t$  (in years) since birth, so  $W = f(t)$ .

- (a) Do you expect  $f'(t)$  to be positive or negative? Explain.

Positive: Since the child is gaining weight,  $f(t)$  is increasing and  $f'(t) > 0$ .

- (b) What are the units of  $f'(t)$ ?

Units are lbs/year

- (c) Explain what  $f'(4) = 7$  tells you in terms of weight and time.

At 4 years of age, the child gains weight at a rate of 7 lbs per year.

- (d) As  $t$  increases, do you expect  $f'(t)$  to increase, decrease, or stay about the same? Explain.

Decrease. As <sup>a child</sup> ~~we~~ gets older, ~~the~~ <sup>the</sup> rate of increase in weight slows.

2. [3 points] Originally, a mutual fund is worth \$5 billion in total. After 3 days, the value of the mutual fund decreases to \$4.6 billion. Estimate the relative rate of change in the value of the mutual fund. Give proper units.

$$\text{RRC} = \frac{f'(a)}{f(a)} \quad , \quad f'(a) \approx \frac{4.6 - 5}{3} = -.133 \text{ billion/day}$$

$$\approx \frac{-.1333 \text{ billion/day}}{5 \text{ billion}} = -0.02667/\text{day}$$

$$\approx \boxed{-2.667\% \text{ per day}}$$

3. [3 points] Graph a function  $f(x)$  such that  $f''(x) > 0$  for all  $x$  and  $f'(x) < 0$  for all  $x$ .

↑  
concave up

↑  
decreasing

