

Show all relevant work!

1. (a) Sketch pictures of (1) an increasing function and (2) a decreasing function.

(b) Write definitions for increasing and decreasing functions in terms of the independent variable ( $x$ ) and the dependent variable ( $y$ ).

2. Use the table below to answer the following questions:

$x$	0	1	2	3	4
$f(x)$	9	8	5	0	-7

(a) find  $f(4)$

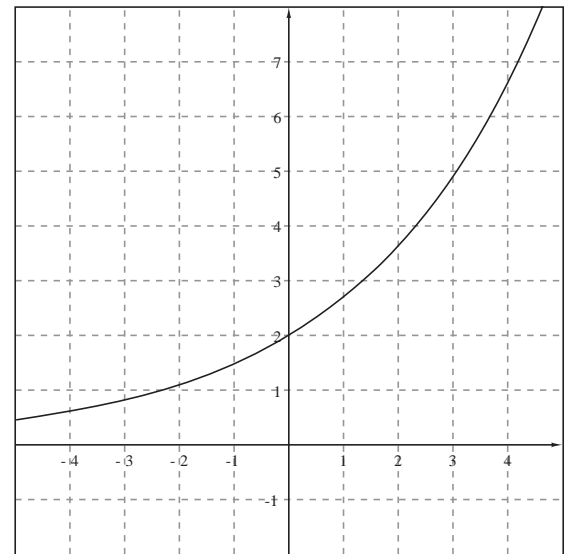
(b) Solve  $f(x) = 0$

(c) Find the average rate of change from  $x = 0$  to  $x = 2$  and then from  $x = 2$  to  $x = 4$ .  
What do you observe from your results?

3. The population of Half Moon Bay since 1995 can be modeled by the function  $P(t) = 10000(1.012)^t$  where  $t$  is in years. Find the average rate of growth in population from 1995 to 1997 and from 1999 to 2001. What do you observe from your results?

4. Use the exponential function,  $g(x)$ , graphed below to answer the given questions.

- (a) Estimate the average rate of change between  $x = -2$  and  $x = 0$ .
- (b) Estimate the average rate of change between  $x = 0$  and  $x = 2$ .
- (c) Estimate  $g(1)$ .
- (d) Estimate the solution to  $g(x) = 7$ .



5. Write formulas for the average rate of change from  $x_1$  to  $x_2$  and from  $x_2$  to  $x_3$  in each function. Discuss the qualitative changes in rates of change (positive to negative, relative size).

