

Print Your name _____

Sign Your name _____

I accept full responsibility under the Haverford Honor System for my conduct on this exam.

Instructions: This is an *open book* exam. You may use your class notes, handouts, homework and textbook. Calculators are permitted. Answer all questions *on the exam sheet*, in the space provided. Partial credit will be given for work which is *clearly* explained. The questions count different amounts, as indicated. Hand in exam sheet with honor pledge signed. If there is any question about interpreting these instructions, please ask.

Time limit: 55 minutes. Total: 35 points.

1. (5 points) Suppose that a function f is given in the following table:

x	$f(x)$
1	4
5	10
9	16

- (a) Explain why the function f is linear.
(b) Find a formula for f .
(c) What is $f(10)$?
2. (5 points) An exponential function $g(x)$ satisfies $g(2) = 10$ and $g(4) = 20$.
- (a) Find the average rate of change of $g(x)$ between $x = 2$ and $x = 4$.
(b) What is $g(6)$? (You can answer this without finding a formula for $g(x)$.)
(c) Find a formula for $g(x)$.

3. (5 points)
- (a) Sketch a graph which (as you go from left to right) is first increasing, concave up, and then becomes increasing, concave down.
 - (b) Give a real-life example that fits the behavior of your function. Be sure to label the axes of your graph to match your example.
4. (3 points each) Answer each TRUE or FALSE. If true, supply a short explanation. If false, provide an explanation or specific counterexample. Answers without explanations will not get any points.
- (a) (TRUE or FALSE?) An irrational number multiplied by an irrational number is always irrational.
 - (b) (TRUE or FALSE?) If $G(t)$ is a function giving the Gross National Product (in dollars) of the United States as a function of time (in years since 1970), then the average rate of change of G has units "years per dollar."
 - (c) (TRUE or FALSE?) The exponential function $f(x) = 2^x$ is always greater than the power function $g(x) = x^2$.
 - (d) (TRUE or FALSE?) The average rate of change of an exponential function is the same between any two points.
 - (e) (TRUE or FALSE?) If A and B are commensurable real numbers, then both A and B are rational.
5. (5 points) Explain, using a proof by contradiction, why a rational number r multiplied by an irrational number x always gives an irrational answer rx .

END OF EXAM