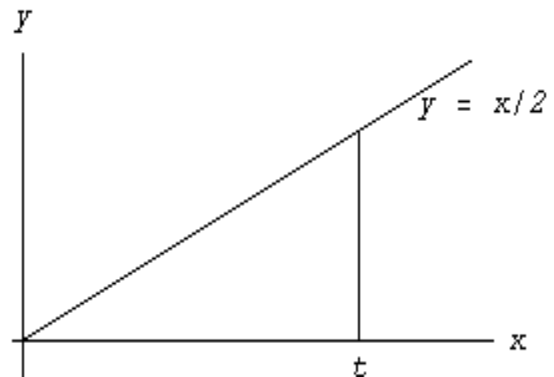
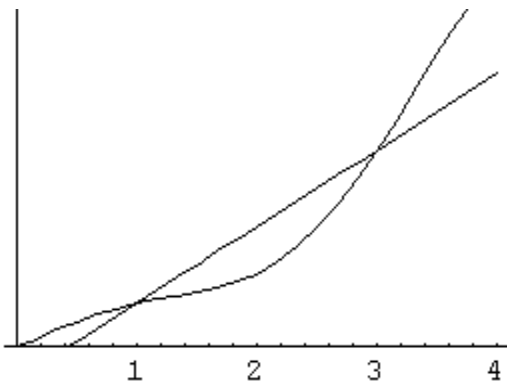


22 September 1997

100 Points

"Show enough work to justify your answers."

- Let $f(x) = \sqrt{1+x}$ and $g(x) = \sin(x^2 - 1)$. Give simplified formulas for $(f \circ g)(x)$ and $(g \circ f)(x)$. (12 points)
- If $f(x) = \frac{1}{x+2}$, give a formula for $f^{-1}(x)$. (13 points)
- Determine the domain and range of $f(x) = \sqrt{9-x^2}$. You may use Mathematica or a graphing calculator to help you think, but give some explanation for your answer. When you finish using Mathematica, delete your function and clear the graph. (12 points)
- Suppose f is a function defined for all real numbers such that $-5 < f(x) < 17$ for $0 < x < 5$. Determine if the following *must* be true, *might* be true, or *cannot* be true. (6 points each)
 - $|f(x)| < 20$ for $0 < x < 5$
 - $f(8) = 20$
- Give a piece-wise formula for the pictured function. (13 points)
(Picture for problem #15, pg. 47, of OZ.)
- The graph of a function f is shown (below left), along with a line cutting through the graph. Explain in your own words why $\frac{f(3)-f(1)}{2}$ is the slope of the line. (13 points)



- Let $A(t)$ be the area of the pictured triangle (above right). Write a formula for $A(t)$ and draw the graph of $A(t)$ for $0 < t < 4$. (12 points)
- A box without a top is constructed from a piece of cardboard, 12 inches by 18 inches, by cutting squares out of the corners and folding up the sides. Give a formula for the volume of the box as a function of the length of the sides of the removed squares. (13 points)