10. (10 pts) Suppose $V(t)$ is the value of a stock portfolio, where t is the time in years since January 1, 2000. Give a practical interpretation (using sentences about the portfolio), of the following numbers.

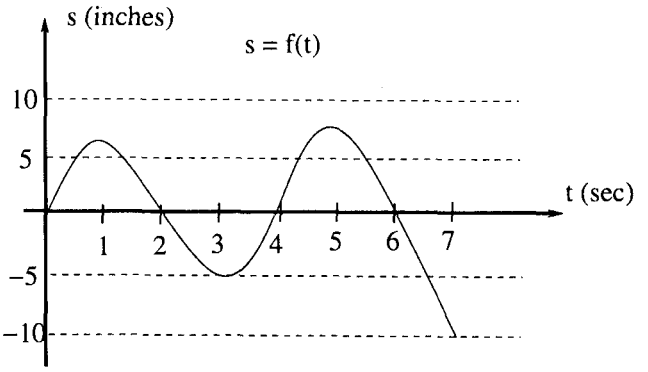
(a) $V(1.5) = 90,000$ at the end of June 2001, the value is \$90,000

(b) $V'(1) = 10,000$ at the end of 2000/beginning 2001, the value is increasing at a rate of \$10,000/year

(c) $V'(3)$ is positive and $V''(3)$ is negative
at the end of 2002/beginning of 2003, the value is increasing, but more slowly than it has been previously

(d) $V^{-1}(100,000) = 2$.
at the end of 2001/beginning of 2002, the value is \$100,000

11. (10 pts) A marble is rolling back and forth along a rail. Let O denote a fixed point on the rail, and let s = f(t) denote the marble's position (in inches) relative to O at time t (in seconds). s is positive to the right of the point O and negative to the left of O. The graph of the function $s = f(t)$ is given below.



(a) What is the average velocity of the marble over the first 7 seconds? avg. velocity $= \frac{-10-0}{7} = \frac{-10}{7}$

b) On which time intervals is the marble rolling to the right? the marble rolls to the right for $0 \le t \le 1$ and $3 \le t \le 5$. this is where f is increasing.

c) On which time intervals is the marble rolling to the left?
rolls to the left for $1 \le t \le 2$ and $5 \le t \le 7$. this is where f is decreasing.

d) On which time intervals does the marble exhibit positive acceleration? negative?
pos. acceleration $\Leftrightarrow$ $f'' > 0 \Leftrightarrow$ graph is concave up
$\Leftrightarrow$ $2 \le t \le 4$

e) On which time intervals is the marble speeding up? slowing down?
Speeding up $\Leftrightarrow$ speed is increasing $\Leftrightarrow$ $f'' > 0 \Leftrightarrow$ $2 \le t \le 4$