

For problems 1 and 2, find equations for the velocity,  $v(t)$  and acceleration  $a(t)$  of a moving object if  $y(t)$  is its displacement.

1.  $y(t) = 5t^4 - 3t^{2.4} + 7t$

2.  $y(t) = 0.3t^{-4} - 5t$

3. An object moves with displacement  $x(t) = -t^3 + 13t^2 - 35t + 27$ , where  $x$  is in feet and  $t$  is in seconds.

a. Find equations for the velocity,  $v(t)$ , and the acceleration,  $a(t)$ .

b. Find the velocity and acceleration at  $t = 1$ ,  $t = 6$ , and  $t = 8$ . At each time, state the object is speeding up or slowing down.

4. An object moves with displacement  $x(t) = t^4 - 11t^3 + 38t^2 - 48t + 50$ , where  $x$  is in feet and  $t$  is in seconds.

a. Find equations for the velocity,  $v(t)$ , and the acceleration,  $a(t)$ .

b. Find the velocity and acceleration at  $t = 1$ ,  $t = 3$ , and  $t = 5$ . At each time, state the object is speeding up or slowing down.

5. Using  $g(x) = 3x - 1$ ,  $h(x) = 3x - 5$ , and  $f(x) = x^2 + 4x$  find the following.

a.  $g(h(x))$

b.  $f(h(x))$

c.  $g(f(x))$

6. In each of the following, write formulas for  $f(x)$  and  $g(x)$  so that  $h(x) = f(g(x))$ .

a.  $h(x) = \sin 3x$

b.  $h(x) = \sin^3 x$

c.  $h(x) = \sin x^3$

d.  $h(x) = 2^{\cos x}$

e.  $h(x) = \frac{1}{\tan x}$

f.  $h(x) = \log(\sec x)$