6. (12 points) The functions $r = f(t)$ and $V = g(r)$ give the radius and the volume of a commercial hot air balloon that is being inflated for testing. The variables t and r are measured in minutes and feet respectively, while the volume V is measured in cubic feet. The inflation begins at $t = 0$.

   Use the information on the tables below to answer questions (i)-(iii). (Question (iv) is independent of the tables.)

t	$f(t)$	$f'(t)$
0	c	d
30	b	x
60	a	z

r	$g(r)$	$g'(r)$
a	b	x
b	c	z
d	x	y

   (i) (2 pts.) How fast is the radius of the balloon increasing initially?

   _____ ft/min.

   (ii) (2 pts.) Assuming f is always increasing for $0 < t < 60$, how much time has ellapsed (since inflation began) when the radius is growing by z ft/min?

   _____ minutes.

   (iii) (3 pts.) How fast is the volume of the balloon increasing a half hour after inflation began?

   _____ ft^3/min.

   (iv) (5 pts.) *(This item is independent of the previous ones).* It turns out that the balloon's surface area increases with the radius by the formula

$$S = h(r) = 4\pi r^2$$

   If the radius of the balloon increases linearly from 5 feet at a rate of 1.5 feet per minute, how fast is the balloon's surface area growing an hour after inflation began? Show your work.