DAY 33 §2.4 INTERPRETATION OF DERIVATIVE
p.101 #3, 6, 13, 21, 42, 43

(3) $T = f(t)$ Temperature of cold yarn placed in hot oven

$(t, f(t)) = (t, T)$ t in minutes, T in °F.

a) $f'(t) > 0$ b/c temp of yarn is increasing. $f(t)$ is increasing.

b) $f'(20) \Rightarrow$ units are $\left(\frac{°F}{min}\right)$

$f'(20) = 2$: The temperature of the yarn is increasing at a rate of 2°F/min at time $t = 20$ minutes after it was placed in the oven.

(6) $Q = f(p)$ Quantity sold based on price of item.

a) $f(150) = 2000$ At a price of $150 per item, a quantity of 2000 items will be sold.

b) $f'(150) = -25$ At a price of $150 per item the quantity sold is decreasing at a rate of 25 units per $1.

$\frac{25 \text{ units}}{\$1.00}$

(13) $W = f(c)$ Weight of an adult human is a function of average calories/day consumed.

units (calories, pounds)

a) $f(1800) = 155$ An adult consuming 1800 calories/day weighs 155 pounds.

$f'(2000) = 0$ an adult consuming 2000 calories/day the weight of is remaining constant.

The adults weight is neither increasing nor decreasing b/c the rate of change is 0 $\frac{\text{pounds}}{\text{avg calories/day}}$

$f^{-1}(162) = 2200$

An adult who weighs 162 lbs consumes 2200 $\frac{\text{calories}}{\text{day}}$ on average.

DAY 33 Continued

(41) The depth of water (in feet) flowing into a tank after t hours.

$(t, h(t)) \rightarrow$ units (hours, feet)

a) $h(5) = 3$ At time $t = 5$ hours the depth of water in the tank is 3ft.

b) $h'(5) = 0.7$ $\frac{\text{ft}}{\text{hrs}}$ At time $t = 5$ hrs the depth of water in the tank is increasing at a rate of $0.7 \frac{\text{ft}}{\text{hour}} = \frac{7\text{ft}}{10\text{hrs}}$.

c) $h^{-1}(5) = 7$ The depth of water in the tank is 5ft at time $t = 7$ hours.

d) $(h^{-1})'(5) = 1.2$ $\frac{\text{hrs}}{\text{ft}}$ When the depth of water in the tank is 5ft, the depth of water increases 1 foot every 1.2 hrs.

$\rightarrow \frac{1.2\text{hrs}}{1\text{ft}}$

(42) $g'(v) = \frac{dg}{dv}$ $g(v)$ is fuel efficiency $\frac{\text{miles}}{\text{gallon}}$ of a car going a speed v $\frac{\text{miles}}{\text{hour}}$ (mph)

$g'(v)$ units $\rightarrow \frac{\left(\frac{\text{miles}}{\text{gallon}}\right)}{\left(\frac{\text{miles}}{\text{hour}}\right)} = \frac{\text{hours}}{\text{gallon}}$

CHOICES: b, e

(43) $g'(55) = -0.54$

$55 \frac{\text{miles}}{\text{hour}}$ $\rightarrow -0.54 \frac{\text{hrs}}{\text{gallon}}$ or $\frac{-0.54 \frac{\text{miles}}{\text{gallon}}}{1 \frac{\text{miles}}{\text{hour}}}$

CHOICES: b, d

b) When the car is going 55mph, the rate of change of fuel efficiency decreases by 0.54 miles/gallon.

d) If the car speeds up from 55mph to 56 mph then the car becomes less fuel efficient by approximately 0.54 miles/gallon.