Week 4 Homework

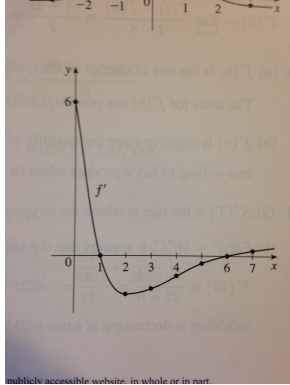## 2.2

2. Use the given graph to *estimate* the value of each derivative. Then sketch the graph of f'.
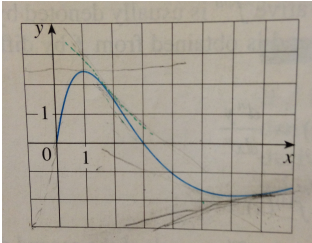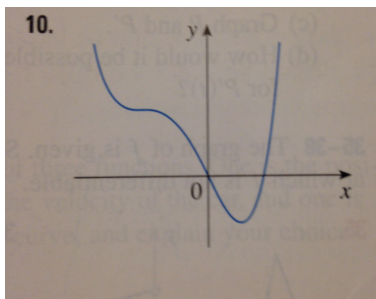

(a) $f'(0) = 6$
(b) $f'(1) = 0$
(c) $f'(2) = -1.5$
(d) $f'(3) = -1.3$ (Note that these are estimates. Answers may differ.)
(e) $f'(4) = -0.8$
(f) $f'(5) = -0.3$
(g) $f'(6) = 0$
(h) $f'(7) = 0.2$
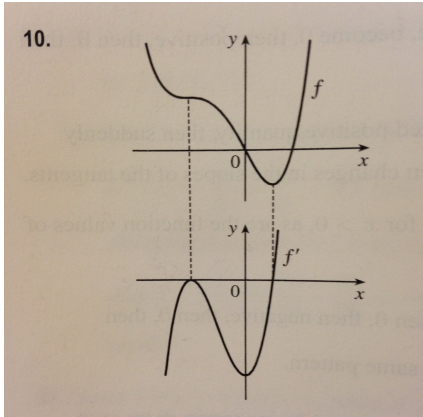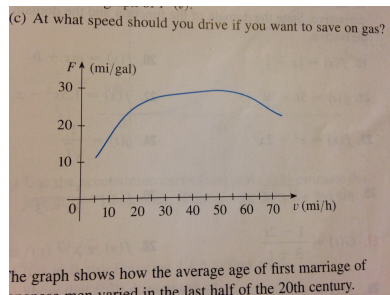
$f'(x)$:

10. Sketch the graph of $f'(x)$.

$f(x)$:

10.

$f'(x)$:

14. Fuel economy F is measured in miles per gallon and speed v is measured in miles per hour.

(c) At what speed should you drive if you want to save on gas?

he graph shows how the average age of first marriage of
... varied in the last half of the 20th century.

(a) What is the meaning of the derivative of $F'(v)$?

$F'(v)$ is the instantaneous rate of change of fuel economy with respect to speed.

(b) Sketch the graph of $F'(v)$.
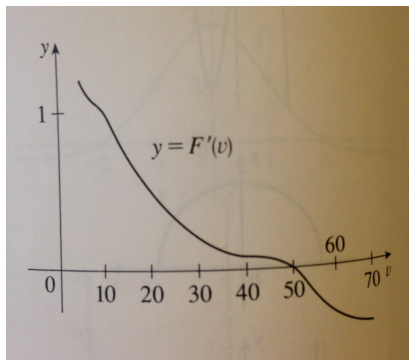
(c) At what speed should you drive if you want to save on gas?

When F' is 0; i.e. at about 50 miles per hour.

2.3

18. Differentiate the function $y = \dfrac{\sqrt{x} + x}{x^2}$.

(Quotient Rule)

$$\frac{d}{dx}(y) = \frac{d}{dx}\left(\frac{\sqrt{x}+x}{x^2}\right) = \frac{\left(\frac{1}{2}x^{(-1/2)}+1\right)(x^2) - \left(\sqrt{x}+x\right)(2x)}{\left(x^2\right)^2}$$

38. Differentiate $y = A + \dfrac{B}{x} + \dfrac{C}{x^2}$.

$$\frac{d}{dx}(y) = \frac{d}{dx}\left(A + \frac{B}{x} + \frac{C}{x^2}\right) = \frac{d}{dx}\left(A + Bx^{-1} + Cx^{-2}\right) =$$

$$= -Bx^{-2} - 2Cx^{-3} \qquad \text{OR} \qquad = \frac{-B}{x^2} - \frac{2C}{x^3}$$