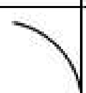
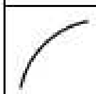
Lesson 3.3.4

3-126. See below:

a. How $f'(x)$ is changing.

b. Students give an explaination.

c.

	Increasing or Decreasing? Walking away from the motion detector? or Walking towards the motion detector?	Concave Up or Concave Down? Getting faster? or Getting slower?	$f'(x)$	$f''(x)$
	*Increasing* *Away from motion detector*	*Concave Up* *Getting faster*	*Positive*	*Positive*
	**[Decreasing & towards the m.d.]**	**[Concave up & getting slower]**	**[Negative]**	**[Positive]**
	**[Decreasing & towards the m.d.]**	**[Concave down & getting faster]**	**[Negative]**	**[Negative]**
	**[Increasing & away from the m.d.]**	**[Concave down & getting slower]**	**[Positive]**	**[Negative]**

d. If the function is increasing, then the slope, $f'(x)$ is positive. If the function is decreasing, then the slope, $f'(x)$ is negative. Increasing & Decreasing has NO effect on $f''(x)$.

e. If the function is concave up, then the slope is increasing, $f''(x)$ is positive. If the function is concave down, then $f''(x)$ is negative. The slope of determines concavity $f'(x)$.

f. no

3-127. Increasing: $x < -2$ or $x > 2$; Decreasing: $-2 < x < 2$; Concave Up: $[0, \infty)$; Concave Down: $(-\infty, 0]$

3-128. See below:

a. (0, 0)

b. $y'' = 0$

3-129. rel max at (–2, 20), relative min at (2, –12), point of infl: (0, 4), inc: $(-\infty,-2)$ and $(2,\infty)$, dec: (–2, 2), CD: $(-\infty,0)$, CU: $(0,\infty)$

Review & Preview

3-131. 0, $f'(4)$, $\frac{f(3)-f(1)}{3-1}$, $f'(1)$

3-132. $y = 24z - 19$

3-133. Answers should be of the form: $f(x) = -4x^{3/2} + \cos x + C$. Students will choose their own constants at this point. They should not be putting "+C" on their answers yet. We will address the "+C" issue in Section 3.4.

3-134. See below:

a. $y'' = 77616x^{97}$

b. $y'' = \frac{3}{4}x^{3/2}$

c. $f'' = -36x^{-4}$

d. $f''(x) = 2\cos x$

3-135. $f'(x) \geq 0$; $x \geq 0.5$

3-136. ≈ 20.275; = 20.5; ≈ 1 % error

3-137. Yes, no

3-138. See below:

a. $y = -\frac{1}{2}$

b. $y' = -\sin x$

c. $y' = -2x + 6$

3-139. See below:

a. Speed is always positive: 32 meters per second.

b. 36 meters, 64 meters

3-140. See below:

a. 625

b. 1

c. 0

d. DNE but $y \to -\infty$