

3-2

48 (a) $[-3, 2) \cup (-2, 2) \cup (2, 3]$

(b) $x = \pm 2$

(c) None

54 $y = \sqrt{x}$

$$y' = \lim_{h \rightarrow 0} \frac{\sqrt{x+h} - \sqrt{x}}{h}$$

$$= \lim_{h \rightarrow 0} \frac{(\sqrt{x+h} - \sqrt{x})(\sqrt{x+h} + \sqrt{x})}{h(\sqrt{x+h} + \sqrt{x})}$$

$$= \lim_{h \rightarrow 0} \frac{x+h-x}{h(\sqrt{x+h} + \sqrt{x})} = \lim_{h \rightarrow 0} \frac{1}{\sqrt{x+h} + \sqrt{x}} = \frac{1}{2\sqrt{x}}$$

tangent line at $(a, \sqrt{a})$ for $a > 0$: $y = \sqrt{a} + \frac{1}{2\sqrt{a}}(x-a)$

cross x -axis at $x = -1 \Leftrightarrow (-1, 0)$ on the line

$$\Leftrightarrow 0 = \sqrt{a} + \frac{1}{2\sqrt{a}}(-1-a) \Leftrightarrow 0 = \frac{1}{2}(\sqrt{a} - \frac{1}{\sqrt{a}}) \Leftrightarrow \sqrt{a} = \frac{1}{\sqrt{a}} \Leftrightarrow a = 1$$

$\therefore$ tangent line at $(1, 1)$: $y = 1 + \frac{1}{2}(x-1)$ is the tangent line to $y = \sqrt{x}$

cross the x -axis at $x = -1$ #