ex Find the point on the graph of $y = x^2$ at which the slope is 8.

$$\lim_{h\to 0} \frac{f(x+h) - f(x)}{h}$$

$$m = \lim_{h\to 0} \frac{(a+h)^2 - a^2}{h}$$

$$8 = \lim_{h\to 0} \frac{\cancel{a^2} + 2ah + h^2 - \cancel{a^2}}{h}$$

$$8 = \lim_{h\to 0} \frac{2ah + h^2}{h}$$

$$8 = \lim_{h\to 0} \frac{\cancel{h}(2a+h)}{\cancel{h}}$$

$$8 = 2a + 0$$

$$4 = a$$

$f(x) = x^2$
$f(x+h) = (x+h)^2$
$f(a+h) = (a+h)^2$

$f(x) = x^2$
$f(4) = 4^2$

$\therefore$ Point is $(4, 16)$

ex. 2 Find the slopes of the tangent lines to the graph of the function $f(x) = \sqrt{x}$ at the points $(1,1)$, $(4,2)$, and $(9,3)$.

$$m = \lim_{h\to 0} \frac{f(x+h) - f(x)}{h}$$

$$m = \lim_{h\to 0} \frac{\sqrt{a+h} - \sqrt{a}}{h} \left(\frac{\sqrt{a+h} + \sqrt{a}}{\sqrt{a+h} + \sqrt{a}}\right)$$

$$= \lim_{h\to 0} \frac{\cancel{a} + h - \cancel{a}}{h(\sqrt{a+h} + \sqrt{a})}$$

$$= \lim_{h\to 0} \frac{\cancel{h}}{\cancel{h}(\sqrt{a+h} + \sqrt{a})}$$

$$m = \frac{1}{\sqrt{a+0} + \sqrt{a}}$$

$$m = \frac{1}{2\sqrt{a}}$$

pt $(1,1)$
$m = \frac{1}{2\sqrt{1}}$
$m = \frac{1}{2}$

pt $(4,2)$
$m = \frac{1}{2\sqrt{4}}$
$m = \frac{1}{4}$

pt $(9,3)$
$m = \frac{1}{2\sqrt{9}}$
$= \frac{1}{6}$

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sheet
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Review
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\# 1-7, 15-35, 39 odds

5) $m = 12$ $\qquad y = 12(x+2)$

7) $m = -\frac{2}{27}$ $\qquad y - \frac{1}{9} = -\frac{2}{27}(x-3)$

9) $m = \frac{1}{4}$ $\qquad y - 2 = \frac{1}{4}(x-3)$