2-7 #6, 8, 15 (KEY)

$\boxed{\#6/P.156}$ To find the slope of the tangent line to the curve $y = x^3$ at the point $(-1, 1)$

(i) <u>using definition 1 P.150:</u> $m = \lim_{x \to a} \frac{f(x) - f(a)}{x - a}$:

$$m = \lim_{x \to -1} \frac{f(x) - f(-1)}{x - (-1)} = \lim_{x \to -1} \frac{x^3 - (-1)}{x + 1}$$

$$= \lim_{x \to -1} \frac{x^3 + 1}{x + 1} = \lim_{x \to -1} \frac{\cancel{(x+1)}(x^2 - x + 1)}{\cancel{(x+1)}}$$

$$= \lim_{x \to -1} (x^2 - x + 1) = 3 .$$

(ii) <u>Using equation 2 P.151</u> $m = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h}$:

$$m = \lim_{h \to 0} \frac{f(-1+h) - f(-1)}{h} = \lim_{h \to 0} \frac{(-1+h)^3 - (-1)^3}{h}$$

$$= \lim_{h \to 0} \frac{\cancel{-1} + 3h - 3h^2 + h^3 + \cancel{1}}{h}$$

$$= \lim_{h \to 0} \frac{\cancel{h}(3 - 3h + h^2)}{\cancel{h}} = \lim_{h \to 0} (3 - 3h + h^2) = 3 .$$

(iii) $\Rightarrow$ The eqn of the tangent line at $(-1, 1)$:

$$y - 1 = 3(x - (-1)) \Rightarrow \boxed{y = 3x + 4}$$

$\boxed{\#8/P.156}$ To find the eqn of the tangent line of the graph of $y = f(x) = \sqrt{2x+1}$ at $(4, 3)$:

The solpe $m = \lim_{h \to 0} \frac{f(4+h) - f(4)}{h} = \lim_{h \to 0} \frac{\sqrt{9+h} - 3}{h}$

(2.7) (2)

$\boxed{\#8/p.156}$ (Cont.) $m = \lim_{h\to 0} \frac{1}{h}\left[\frac{(\sqrt{9+h}-3)(\sqrt{9+h}+3)}{\sqrt{9+h}+3}\right]$

$m = \lim_{h\to 0} \frac{1}{h}\left(\frac{\cancel{9}+h-\cancel{9}}{\sqrt{9+h}+3}\right) = \lim_{h\to 0} \frac{1}{\sqrt{9+h}+3} = \frac{1}{6}$

$\Rightarrow$ The required eqn: $y-3 = \frac{1}{6}(x-4) \Rightarrow$

$6y-18 = x-4 \Rightarrow x-6y+14=0.$

$\boxed{\#15/p.156}$ Look Carefully to the given graph related to the problem on page 156 $\Rightarrow$

a) The initial velocity = the slope at $(0,0) = 0$.

b) The slope at $B <$ The slope at $C \Rightarrow$ faster at C.

c) The slope at $A >$ The slope at $B \Rightarrow$ speeding up at A and slowing down at B. While before C is speeding up and after C slowing down.

d) Between D and E the slope $=0 \Rightarrow$ no movement.