3-0235 — 50 SHEETS — 5 SQUARES
3-0236 — 100 SHEETS — 5 SQUARES
3-0237 — 200 SHEETS — 5 SQUARES
3-0137 — 200 SHEETS — FILLER
COMET

1) $\dfrac{f(x)-f(3)}{x-3}$

$$\lim_{x\to 3} \frac{f(x)-f(3)}{x-3}$$

3) a. $m = \lim_{x\to a} \dfrac{f(x)-f(a)}{x-a} = \lim_{x\to 1} \dfrac{(4x-x^2)-3}{x-3}$

$$= \lim_{x\to 1} \frac{-(x^2-4x+3)}{x-1}$$

$$= \lim_{x\to 1} \frac{-(x-1)(x-3)}{x-1}$$

$$= \lim_{x\to 1} -(x-3)$$

$$\boxed{=2}$$

$$m = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h} = \lim_{h\to 0} \frac{4(a+h)-(a+h)^2-3}{h}$$

$$= \lim_{h\to 0} \frac{4(1+h)-(1+h)^2-3}{h}$$

$$= \lim_{h\to 0} \frac{4+4h-1-2h-h^2-3}{h}$$

$$= \lim_{h\to 0} \frac{2h-h^2}{h}$$

$$= \lim_{h\to 0} 2-h$$

$$\boxed{=2}$$

b. $y-y_1 = m(x-x_1)$

$y-3 = 2(x-1)$

$y-3 = 2x-2$

$y = 2x+1$

c. Graph with calculator

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6. $y = 2x^3 - 5x \quad P: (-1, 3)$

$$m = \lim_{x \to a} \frac{f(x) - f(a)}{x - a} = \lim_{x \to -1} \frac{2x^3 - 5x - 3}{x + 1}$$

aside: divide $x+1$ into $2x^3 - 5x - 3$ or factor $2x^3 - 5x - 3$

$$\begin{array}{r} 2x^2 - 2x - 3 \\ x+1 \overline{\big) 2x^3 \qquad - 5x - 3} \\ \underline{2x^3 + 2x^2} \\ -2x^2 - 5x \\ \underline{-2x^2 - 2x} \\ -3x - 3 \\ \underline{-3x - 3} \\ 0 \end{array}$$

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

$$= \lim_{x \to -1} 2x^2 - 2x - 3$$

$$= 2 + 2 - 3$$

$$\boxed{m = 1}$$

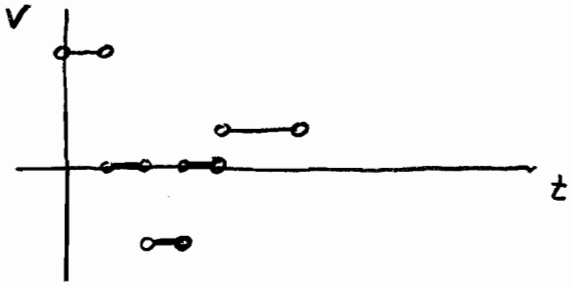
$y - y_1 = m(x - x_1)$

$y - 3 = 1(x - (-1))$

$\boxed{y = x + 4}$

11) a. moving right: $(0,1) \cup (4,6)$
moving left: $(2,3)$
stationary: $(1,2) \cup (3,4)$

b. Graph of Velocity



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13) $f(t) = 40t - 16t^2$. Find velocity when $t = 2$. Same as finding slope of tangent line at $t = 2$.

$$m = \lim_{t \to 2} \frac{f(t) - f(a)}{x - a} = \lim_{t \to 2} \frac{40t - 16t^2 - f(2)}{x - 2}$$

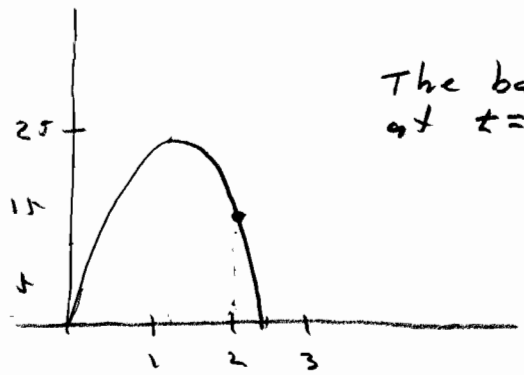
$$= \lim_{t \to 2} \frac{-16t^2 + 40t - 16}{x - 2}$$

$$= \lim_{t \to 2} \frac{(-16t - 8)(x - 2)}{x - 2}$$

$$= \lim_{t \to 2} (-6t - 8)$$

$$= -24 \text{ m/s}$$

$\therefore$ instantaneous velocity at $t = 2$ is -24 m/sec



The ball is on its way down at $t = 2$.

17) $g'(0) < 0 < g'(4) < g'(2) < g'(-2)$

$g'(0)$ is the only negative slope, all others are positive. Thus, $\emptyset$ comes next. The positive slopes are ranked by visual inspection.

18) $y = g(x)$ $g(5) = -3$, $g'(5) = 4$

Equation of tangent line at $x = 5$?

Slope at $x = 5$ is 4 because $g'(5) = 4$

$y - y_1 = m(x - x_1)$ $\qquad y - (-3) = 4(x - 5)$

$y = 4x - 23$

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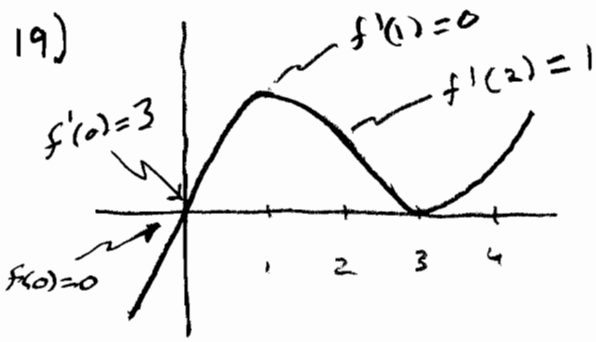
18) b. $y = f(x)$ passes through $(4,3)$, therefore $\boxed{f(4) = 3.}$

The line tangent to $f(x)$ at $(4,3)$ also passes through $(0,2)$, therefore we have two points and can compute slope of the line.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2-3}{0-4}$$

$$= \frac{1}{4}$$

$\therefore \boxed{f'(4) = 1/4}$

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