21. 1

$x^2 - 4x = 2y - 2$

$2x - 4 = 2\frac{dy}{dx}$

$x - 2 = \frac{dy}{dx}$

$\frac{d^2y}{dx^2} = 1$

22. $y - 2 = 5(x-1)$

$y = 3x^2 - x$ @ $x = 1$

$y' = 6x - 1$ $y = 3(1)^2 - 1$

$y'(1) = 5$

23. $y - 7 = \frac{24}{7}(x-4)$

$y = (x^3 - 15)^{1/2}$ $(4, 7)$

$y' = \frac{1}{2}(x^3-15)^{-1/2}(3x^2)$

$y'(4) = \frac{1}{2}(49)^{-1/2}(48)$

24. $\emptyset$

$f(x) = (x-9)^2$ || to y-axis

$f'(x) = 2(x-9)(1)$ m = undef

$0 = x - 9$ @ $x = 9$

25. $x = -\frac{3}{2}$

$f(x) = 8 - 3x - x^2$ || to x-axis

$f'(x) = -3 - 2x$ m is 0

$0 = -3 - 2x$ @ $x = -\frac{3}{2}$

26. $c = 0$

$f(x) = 3x^2 + 5x - 2$ $[-1, 1]$

MVT $f(-1) = -4$ $m_{sec} = \frac{6+4}{1+1} = 5$

$f(1) = 6$

$f'(x) = 6x + 5$ $5 = 6x + 5$ $x = 0$

27. NOT CONTINUOUS ON $[-1, 2]$

DOESN'T HOLD TRUE

$f(x) = \frac{6}{x} - 3$ $[-1, 2]$

MVT $f(-1) = -9$ $m_{sec} = \frac{9}{2+1} = 3$

$f(2) = 0$

$f'(x) = -\frac{6}{x^2}$ $3 = -\frac{6}{x^2}$ $\emptyset$

28. $c = 4$

$f(x) = x^2 - 8x + 12$ $[2, 6]$

$f'(x) = 2x - 8$ $f(2) = 0$

$0 = 2x - 8$ $f(6) = 0$

29. $c = \frac{1}{8}$

$f(x) = x^{\frac{2}{3}} - x^{\frac{1}{3}}$ $[0, 1]$

$f'(x) = \frac{2}{3}x^{-\frac{1}{3}} - \frac{1}{3}x^{-\frac{2}{3}}$ $f(0) = 0$

$0 = \frac{2}{3}x^{-\frac{1}{3}} - \frac{1}{3}x^{-\frac{2}{3}}$ $f(1) = 0$

$x^{-\frac{2}{3}} = 2x^{-\frac{1}{3}}$ $\left(x^{-\frac{2}{3}}\right)^{-3} = \left(2x^{-\frac{1}{3}}\right)^{-3}$

$x^2 = \frac{1}{8}x$ $x(x - \frac{1}{8}) = 0$ undefined at $x = 0$

30. $y = x^3 - 9x - 6$

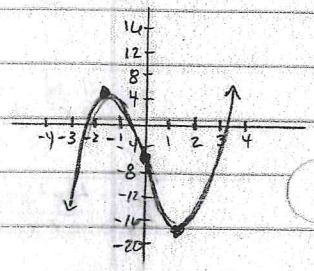
$y' = 3x^2 - 9$ $y'' = 6x$

$0 = 3x^2 - 9$ $0 = 6x$

$3 = x^2$ $x = \pm\sqrt{3}$ $x = 0$

y-int = $(0, -6)$

INTERVALS x-values	f(x)	f'(x)	f''(x)	CHARACT. OF GRAPH
$(-\infty, -\sqrt{3})$		+	−	inc ↑ c.D.∩
$x = -\sqrt{3}$	4.392			local max
$(-\sqrt{3}, 0)$		−	−	dec ↓ c.D ∩
$x = 0$	−6			Point of Inf
$(0, \sqrt{3})$		−	+	dec ↓ c.U. ∪
$x = \sqrt{3}$	−16.392			local min
$(\sqrt{3}, \infty)$		+	+	inc ↑ c.U. ∪



31. $y = \frac{3x^2}{x^2 - 4}$

$y' = \frac{(x^2-4)(6x) - 3x^2(2x)}{(x^2-4)^2}$

$y' = \frac{-24x}{(x^2-4)^2}$ $y'' = \frac{24(3x^2+4)}{(x^2-4)^3}$

C.V. $0, \pm 2$ No P.I.

Dom $x \neq \pm 2$ V.A. $x = \pm 2$

H.A. $y = 3$

INTERVALS x-VALUES	f(x)	f'(x)	f''(x)	CHAR GRAPH
$(-\infty, -2)$		+	+	inc ↑ C.U.U
$(-2, 0)$		+	−	inc ↑ C.D.∩
$x = 0$	0			local max
$(0, 2)$		−	−	dec ↓ C.D.∩
$(2, \infty)$		−	+	dec ↓ C.U.∪