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

19) $f(x) = x^5 - 5x + 3$

$f'(x) = 5x^4 - 5 = 5(x^4-1) = 5(x^2+1)(x^2-1) = 5(x^2+1)(x+1)(x-1)$

$f''(x) = 20x^3$

a. first derivative test

$f'(x) = 0$ at ± 1

	$5x^4-5$	f'
$x < -1$	+	+
$-1 < x < 1$	−	−
$x > 1$	+	+

$x = -1$ max at 7

$x = 1$ min at -1

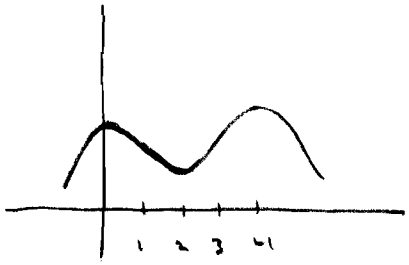
b. Second deriv.

$f' = 0$ at $x = \pm 1$

$f''(-1) < 0 \therefore$ CCD & $x = -1$ max

$f''(1) > 0 \therefore$ CCU & $x = 1$ min

25)



min/max at $x = 0, 2, 4$

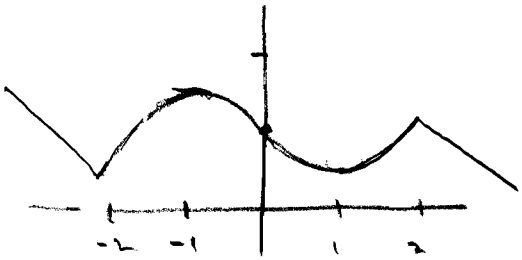
increasing $x < 0$, $2 < x < 4$

decreasing $0 < x < 2$, $x > 4$

CCU $1 < x < 3$

CCD $x < 1$, $x > 3$

26)



min/max at $x = 1, -1$

✓ decreasing $|x| < 1 \rightarrow -1 < x < 1$

✓ increasing $1 < |x| < 2 \rightarrow -2 < x < -1$, $1 < x < 2$

✓ slope of -1 $|x| > 2 \rightarrow x < -2$, $x > 2$

✓ CCD $-2 < x < 0$

✓ inflection at $0, 1$

31) a. inc $(0,2), (4,6), (8,\infty)$

dec $(2,4)$ $(6,8)$

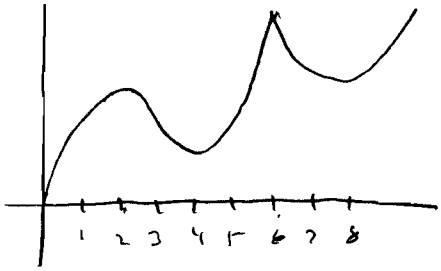
b. loc min/max at $x = 2, 4, 6, 8$ mins: 4, 6 max: 2, 8

c. CCU: f' increas $(3,6), (6,\infty)$

CCD: $(0,3)$

d. Inflection point where concavity changes: $x = 3$

e.



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33) $f(x) = 2x^3 - 3x^2 - 12x$

$f'(x) = 6x^2 - 6x - 12 = 6(x^2 - x - 1) = 6(x-2)(x+1)$

$f''(x) = 12x - 6 = 6(2x-1)$

critical numbers at $x=2$, $x=-1$

a.

	$x-2$	$x+1$	f'
$-1 < x$	−	−	+
$-1 < x < 2$	−	+	−
$x > 2$	+	+	+

$\therefore$ increasing $(-\infty,-1), (2,\infty)$
decreasing $(-1,2)$

b. local max at $x=-1$ of 7
local min at $x=2$ of -20

c. $f''=0$ at $x=\frac{1}{2}$

	$6(2x-1)$	f''
$\frac{1}{2} < x$	−	−
$x > \frac{1}{2}$	+	+

$\therefore$ concave down $(-\infty,\frac{1}{2})$
concave up $(\frac{1}{2},\infty)$
inflection point at $x=\frac{1}{2}$

46) $f(x) = \dfrac{x^2}{(x-2)^2}$

a. HA: $f(x) = \dfrac{x^2}{x^2-4x+4}$ $\quad \lim_{x\to\pm\infty} f(x) = 1$ $\quad\therefore$ Horiz at $y=1$

VA: $\lim_{x\to 2^+} f(x) = \infty$ $\quad\therefore$ Vertical at $x=2$

b. $f'(x) = \dfrac{-4x}{(x-2)^3}$

Critical numbers at $x=0$, $x=2$

	$-4x$	$(x-2)^3$	f'
$0 < x$	+	−	−
$0 < x < 2$	−	−	+
$x > 2$	−	+	−

$\therefore$ decreasing $(-\infty,0), (2,\infty)$
increasing $(0,2)$

c. local min at $x=0$ of 0

d. $f''(x) = \dfrac{8(x+1)}{(x-2)^4}$ $\quad f''=0$ at $x=-1$
f'' DNE at $x=2$

	$8(x+1)$	$(x-2)^4$	f''
$-1 < x$	−	+	−
$-1 < x < 2$	+	+	+
$x > 2$	+	+	+

$\therefore$ CC Down $(-\infty,-1)$
CC up $(-1,2), (2,\infty)$
Inflection at $x=-1$

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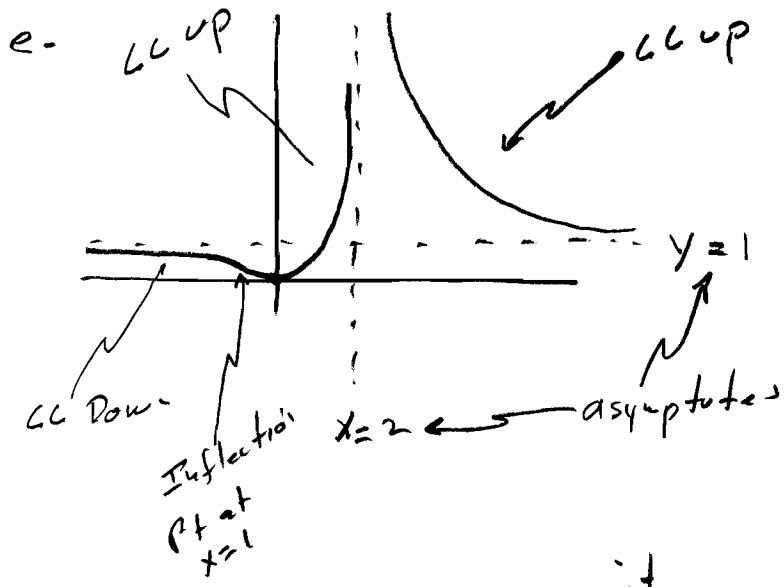
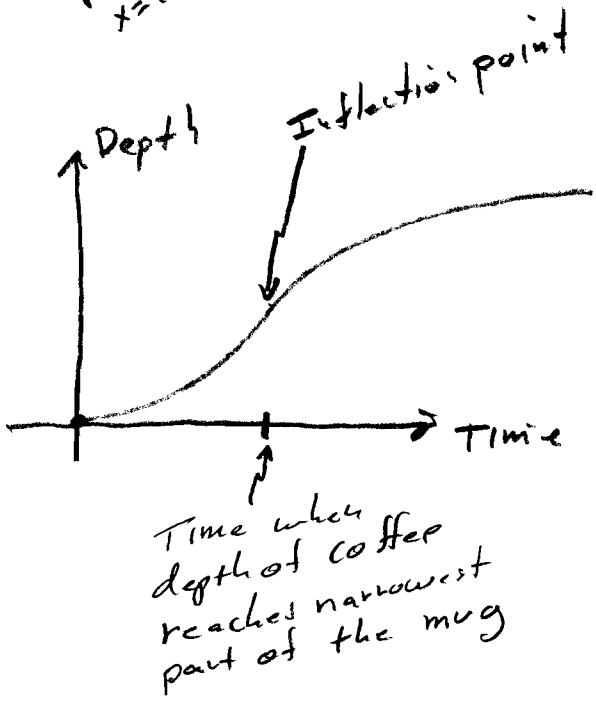
e-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