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) a. $(1,3)$, $(4,6)$

b. $(0,1)$, $(3,4)$

c. $(0,2)$,

d. $(2,4)$, $(4,6)$

e. $(2,3)$

3) a. Use I/D test; $f'(x) > 0$ or < 0 on an interval
b. Concavity Test; $f''(x)$
c. Values of x where concavity changes sign

6) a. increasing $(0,1)$, $(3,5)$
decreasing $(1,3)$, $(5,6)$

b. local max or min when $f'=0$ at $x=1$, $x=3$, $x=5$
$\therefore$ max at $x=1$, $x=5$
min at $x=3$

7) Inflection points where concavity changes sign.
$\therefore$ Inflection points at $x=1$, $x=7$

9) $f(x) = 2x^3 + 3x^2 - 36x$
$f'(x) = 6x^2 + 6x - 36 = 6(x^2+x-6) = 6(x+3)(x-2)$
$f''(x) = 12x + 6$

a. Intervals when f is increasing / decreasing

$f'(x) = 6(x+3)(x-2)$
critical numbers $x=-3$, $x=2$

	$x+3$	$x-2$	f'
$x<-3$	$-$	$-$	$+$
$-3<x<2$	$+$	$-$	$-$
$x>2$	$+$	$+$	$+$

$\therefore$ increasing: $(-\infty,-3)$, $(2,\infty)$
decreasing: $(-3,2)$

b. local min and max
$x=-3$: local max of 81
$x=2$: local min of -44

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c. Concavity and inflection points

$f''(x) = 12x+6$

$f''=0$ when $x=-1/2$ ∴ Inflection point at $x=-1/2$

	$12x+6$	f''	
$x<-1/2$	$-$	$-$	∴ concave down on $(-\infty, -1/2)$
$x>-1/2$	$+$	$+$	concave up on $(-1/2, \infty)$

16. $f(x) = x^2 \ln x$

$f'(x) = 2x\ln x + \frac{x^2}{x} = x(2\ln x + 1)$

$f''(x) = 2\ln x + \frac{2x}{x} + 1 = 3 + 2\ln x$

a. where is f increasing / decreasing

critical numbers where $f'(x)=0$

$x(2\ln x+1)=0$

$x=0$

$2\ln x+1=0$

$\ln x = -1/2$

$x = e^{-1/2}$

but 0 is not in domain of f, so critical numbers are $x=e^{-1/2}$

	x	$2\ln x+1$	f'	
$0<x<e^{-1/2}$	$+$	$-$	$-$	∴ f increasing $(0, e^{-1/2})$
$x>e^{-1/2}$	$+$	$+$	$+$	f decreasing $(e^{-1/2}, \infty)$

b. local max and min of f

$x=e^{-1/2}$ is a local min because decreasing to the left and increasing to the right

$f(e^{-1/2}) = (e^{-1/2})^2 \ln e^{-1/2} = e^{-1}(-1/2) = -\frac{1}{2e}$

c. Inflection points and concavity

$f''(x) = 3+2\ln x$

Inflection points when $f''=0$

$3+2\ln x=0$

$\ln x = -3/2$

$x = e^{-3/2}$

$f''>0$ when $3+2\ln x>0$

$\ln x > -3/2$

$x = e^{-3/2}$

	$3+2\ln x$	f''	
$0<x<e^{-3/2}$	$-$	$-$	concave down
$x>e^{-3/2}$	$+$	$+$	∴ concave up