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

40) $g(x) = x^{1/3} - x^{-2/3}$, Find critical numbers

Critical numbers @ $g'(x) = 0$ or $g'(x)$ DNE

$$g'(x) = \frac{1}{3}x^{-2/3} - \left(-\frac{2}{3}x^{-5/3}\right)$$

$$= \frac{1}{3}x^{-5/3}(x+2)$$

$$= \frac{x+2}{3x^{5/3}}$$

$g'(x) = 0$ when $x+2=0$
$x=-2$

$g'(x)$ DNE when $3x^{5/3} = 0$
$x=0$, but 0 is not in the domain of f.

$\therefore$ $\boxed{\text{critical numbers: } x=-2}$

43) $f(x) = x^2 e^{-3x}$, Find critical numbers

$$f'(x) = 2xe^{-3x} + x^2(-3e^{-3x})$$

$$= xe^{-3x}(2-3x)$$

$f'(x) = 0$ when $x=0$ and $2-3x=0$
$x = 2/3$

$f'(x)$ exists over entire domain

$\therefore$ $\boxed{\text{critical numbers: } x = 0, 2/3}$

47) $f(x) = 3x^2 - 12x + 5$ $[0,3]$ find absolute max + min
$f'(x) = 6x - 12$
$f'(x) = 0$ when $6x-12=0$ $x=2$

By closed interval method, extreme value occur at end points or critical numbers.

$f(0) = 5$
$f(2) = -7$
$f(3) = -4$

$\therefore$ $\boxed{\begin{array}{l}\text{Absolute max of } 5 \text{ at } x=0 \\ \text{Absolute min of } -7 \text{ at } x=2\end{array}}$

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48) $f(x) = x^3 - 3x + 1$ $[0,3]$, Find abs max + min

$f'(x) = 3x^2 - 3$

$f'(x) = 0$ when $3x^2 - 3 = 0$

$3x^2 = 3$

$x^2 = 1$

$x = \pm 1$, but -1 is not in $[0,3]$

$f(0) = 1$
$f(1) = -1$
$f(3) = 19$

$\therefore$ Absolute min of -1 at $x = 1$
Absolute max of 19 at $x = 3$

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

$f'(x) = 3(x^2 - 1)^2 \cdot 2x$

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

$f'(x) = 0$ when $x = 0$, $x^2 - 1 = 0$
$x^2 = 1$
$x = \pm 1$

$f(-1) = 0$
$f(0) = -1$
$f(1) = 0$
$f(2) = 27$

$\therefore$ Absolute max of 27 at $x = 2$
Absolute min of -1 at $x = 0$

56) $f(t) = \sqrt[3]{t}(8 - t)$ $[0, 8]$

$f'(t) = \frac{8}{3} t^{-2/3} - \frac{4}{3} t^{1/3} = \frac{4(2 - t)}{3\sqrt[3]{t^2}}$

$f'(t) = 0$ when $4(2 - t) = 0$ $\therefore$ $t = 2$
$f'(t)$ DNE when $t = 0$

$f(0) = 0$
$f(2) = 6\sqrt[3]{2}$
$f(8) = 0$

$\therefore$ Absolute max of $6\sqrt[3]{2}$ at $x = 2$
Absolute min of 0 at $x = 0, 8$