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

7) $x = .8, 3.2, 4.4, 6.1$

10) a. secant through $(-2,-4)$ and $(2,4)$ is

$m = \frac{8}{4} = 2$

$y - 4 = 2(x-2)$

$y = 2x$

$\boxed{x \approx -1.2, 1.2}$

b) $f(x) = x^3 - 2x \quad [-2, 2]$

$f(b) - f(a) = f'(c)(b-a)$

$f(2) - f(-2) = f'(c)(2-(-2))$

$f(2) = 2^3 - 2 \cdot 2 = 4 \qquad f(-2) = (-2)^3 - 2\cdot(-2) = -8 + 4 = -4$

$4 - (-4) = f'(c)(4)$

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

$8 = (3c^2 - 2)(4)$

$8 = 12c^2 - 8$

$12c^2 = 16$

$c^2 = \frac{4}{3}$

$\boxed{c = \pm\frac{2}{\sqrt{3}} \approx \pm 1.1547}$

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13) $f(x) = e^{-2x}$, $[0,3]$

Verify $f(x)$ satisfies hypotheses of MVT on $[0,3]$

- e^{-2x} is continuous on $[0,3]$
- e^{-2x} is differentiable on $(0,3)$

Find c that satisfies MVT on $[0,3]$

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

$f(b) - f(a) = f'(c)(b-a)$

$f(b) = f(3) = e^{-6}$ $\quad f(a) = f(0) = e^{0} = 1$

$(e^{-6} - 1) = -2e^{-2c}(3)$

$e^{-6} - 1 = -6e^{-2c}$

$\frac{1-e^{-6}}{6} = e^{-2c}$

$\ln\left(\frac{1-e^{-6}}{6}\right) = -2c$

$$\boxed{c = -\frac{1}{2}\ln\left(\frac{1-e^{-6}}{6}\right)}$$

17) Show that $1 + 2x + x^3 + 4x^5 = 0$ has exactly one real root.

$f(1) = 8$, $f(-1) = -6$, $\therefore$ by IVT there is a root in $(-1,1)$

Assume 2 real roots at a and b. $\therefore f(a) = 0$ and $f(b) = 0$.

By Rolle's Thm, there must be c in (a,b) s.t. $f'(c) = 0$.

$f'(x) = 20x^4 + 3x^2 + 2$. So $f'(x) \geq 2$ for all x.

Since $f'(x) \geq 2$ for all x, $f'(c)$ can not $= 0$.

$\therefore$ Contradiction, so assumption of 2 real roots must be wrong.

34) Use MVT with interval $[0, 1/6]$, and $V(0) = 30$, $V(\frac{1}{6}) = 50$ where V is the velocity function. So $V'(t)$ = acceleration.

By MVT,

$$V(b) - V(a) = V'(c)(b-a)$$

$$50 \text{ mph} - 30 \text{ mph} = V'(c)\left(\tfrac{1}{6} - 0\right)$$

$$\frac{20 \text{ mph}}{1/6 \text{ hrs}} = V'(c)$$

$$V'(c) = 120 \text{ m/hr}$$

$\therefore$ there must be a number c in $(0, 1/6)$ where accel $= 120$ mi/hr^2

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