# Section 4.3

- 1st Derivative test (4.2) w/ Chart
- 2nd Derivative test w/ chart
- Concavity
- Point of Inflection

**Example**

$y = 2x^3 - 14x^2 + 22x - 5 \quad x \geq 0$

**Describe this function**

$y' = 6x^2 - 28x + 22 = 0$

Critical Pts $(\frac{11}{3}, -13.96)$

$x = \frac{11}{3} \quad x = 1$ (end pt) $(1, 5)$ $(0, -5)$

| Intervals | $(0, 1)$ | $(1, \frac{11}{3})$ | $(\frac{11}{3}, \infty)$ |
|---|---|---|---|
| Sign of $f'$ | pos | Neg | pos |
| Behavior of $f$ | Inc | Dec | Inc |

Second Derivative Test

$y'' = 12x - 28 = 0$

$x = \frac{7}{3}$

$(\frac{7}{3}, -4.5)$ point of Inflection

| Interval | $(0, \frac{7}{3})$ | $(\frac{7}{3}, \infty)$ |
|---|---|---|
| Sign of $f''$ | Neg | pos |
| Behavior $f$ | Concave Down | Concave up |

## Summary

Critical Points

-- f' = 0

-- End points

-- Where f' Does Not Exist

First Derivative

-- f' = 0 to find critical pts (max min)

-- f' > 0 the function is increasing

-- f' < 0 the function is decreasing

Second Derivative

-- f'' = 0 Infection Point

-- f'' > 0 The function is concave up

-- f'' < 0 the function is concave down