

Review

1. midterm: $f(x) = 3 \ln(2) + x$
 what is $f'(x)$?

$f'(x) = 1$

2. Homework: ClassPacket Optimization Page46-48

Ex 15:

Relative

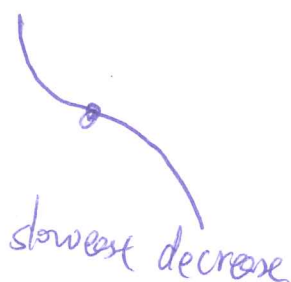
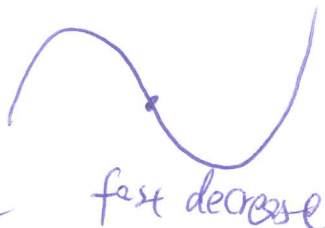
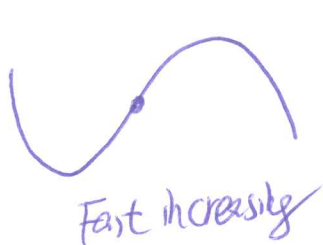
$f''(c) > 0 \Leftrightarrow$ concave up $\cup \Leftrightarrow$ minimum

Ex 16:

$f''(c) < 0 \Leftrightarrow$ concave down $\cap \Leftrightarrow$ Relative maximum

$f''(c) = 0 \Leftrightarrow (c, f(c))$ is a reflection point | no conclusion about extreme pts

1. Inflection point (The most or the least rapid change) ClassPacket page44.



$-5 \leq x \leq 10$
 $-40 \leq y \leq 40$

$f(x) = -x^3 + 6x^2$

$f(x) = x^3 + x$

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

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

Ex $f(x) = 3x^2 + \frac{b}{x} + \ln(4)$ has critical point at $x = 2$.

Q1: Solve b

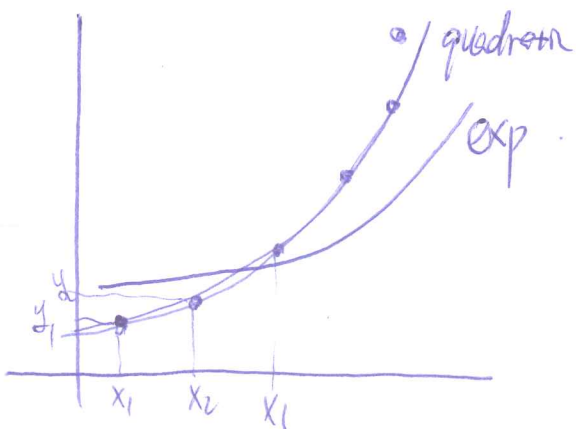
$f'(x) = 6x - b x^{-2}$

$f'(2) = 0 \quad b = 48$
 $12 - \frac{b}{4} = 0$

Q2: Determine $x = 2$ as relative maximum or minimum or neither.

$f''(x) = 6 + 2 \times 48 x^{-3}$ $f''(2) > 0$ \cup relative minimum

2. How to find the best model more professional? ClassPacket page 42.



$r = (y_1 - f(x_1))^2 + (y_2 - f(x_2))^2 + \dots + (y_{10} - f(x_{10}))^2$

1

The smallest r gives the best model.

3. Using Ti-84 solving an equation

Example: $f(x) = 6x^3 - 13x^2 - 99x + 70 = 0$

$$Y1 = 6x^3 - 13x^2 - 99x + 70 = 0$$

$$-10 < x < 10 \text{ and } -230 < y < 230$$

2nd/Calc/Zero

$$x_1 = 3.5 \quad x_2 = 0.666 \quad x_3 = 5$$

$$\begin{array}{|l} \text{Window} \\ \hline X_{\min} = -10 \\ X_{\max} = 10 \\ Y_{\min} = -230 \\ Y_{\max} = 230 \end{array}$$

graph

4. Optimization using Ti-84 The following function is from a project in the last year.

The Demand Function $D(x)$

$$D(x) = \frac{1263.36}{1 + 0.09e^{0.28x}}$$

Test $Y1(2) = 2182.7979$

The Revenue Function $R(x)$

$$R(x) = xD(x) = \frac{1263.36x}{1 + 0.09e^{0.28x}}$$

Find the price which gives the maximal revenue.

Solve $R'(x) = 0$

• $Y1 = R(x)$

• $Y2 = nDeriv(Y1, X, X)$

$$= \frac{d}{dx}(Y1) \Big|_{x=X}$$

$$\begin{array}{|l} \text{Window} \\ \hline X_{\min} = 0 \\ X_{\max} = 30 \end{array}$$

Zoom \rightarrow 0 : ZoomFit

2nd/Calc/zero

$$x = 7.9071917$$

$$y = 0$$

