

## Homework 04

1. Section 3.2: problems 17, 48(\*), 57, 58(\*).

Hint for problem 17: Use the definition and the technique of "rationalizing the numerator or denominator".

Remark: Optionally, you can hand in problems with (\*) by Oct 12 in class for reviews and corrections.

2. Read about second and higher order derivatives at end of section 3.3.
3. Section 3.3: problems 5, 23, 37, 47, 55(\*), 67, 70(\*), 75(c).
4. Use product rule to show (and memorize) that

$$\begin{aligned}\frac{d}{dx} \begin{vmatrix} f_{11}(x) & f_{12}(x) \\ f_{21}(x) & f_{22}(x) \end{vmatrix} &= \begin{vmatrix} f'_{11}(x) & f_{12}(x) \\ f'_{21}(x) & f_{22}(x) \end{vmatrix} + \begin{vmatrix} f_{11}(x) & f'_{12}(x) \\ f_{21}(x) & f'_{22}(x) \end{vmatrix} \\ &= \begin{vmatrix} f'_{11}(x) & f'_{12}(x) \\ f_{21}(x) & f_{22}(x) \end{vmatrix} + \begin{vmatrix} f_{11}(x) & f_{12}(x) \\ f'_{21}(x) & f'_{22}(x) \end{vmatrix}\end{aligned}$$

What are the corresponding formulae for 3 by 3 determinants, 4 by 4 determinants, etc.?

5. Apply the product rule repeatedly to get  $\frac{d^n}{dx^n} (u(x)v(x))$  in terms of derivatives of  $u(x)$  and  $v(x)$ . Start with  $n = 2$ , then  $n = 3, \dots$ , to find the formula.