

**MATH101, Fall 2017**  
**Homework**

*DISCLAIMER: This homework is due by Friday 05/01/2018. HW can be handed in person in the tutorials or lectures from now till the deadline. You can send an electronic version (taking a picture of your HW and sending it by e-mail is not considered electronic version of the HW) (pdf, word, ...) per e-mail. Make sure you hand in teh HW by any modality acceptable by the deadline. Late HWks will not be accepted.*

*REMINDER:*

*“If any two or more homeworks appear to be isomorphic (see <https://en.wikipedia.org/wiki/Isomorphism>) we will grade isomorphic parts once and divide the points achieved equally by the number of isomorphic homework write-ups. Use this HW as an opportunity for some self-study for the final, on top of it, you get an extra chance to earn some points towards the final grade. You will show wisdom, if you don’t waste this chance.”*

*If you find something is not clear, or you need a hint, please ask questions, per e-mail or in person! This, of course is not to be done before you put sincere and genuine effort into solving these problems. Nevertheless, if you don’t think you understand what you are asked to do, ask me or Prof. Miller or any of the assistents before you ask anyone else. We wish you a lot of success!*

**1.** For the following functions:

- a) Find the domain and asymptotes
- b) Find  $f'$ , intervals of monotonicity and local extrema
- c) Find second derivative and intervals of concavity
- d) Make a table of points and graph the function

1.  $f(x) = \frac{x^2}{9-x^2}$

2.  $f(x) = \frac{x^2+3}{x+1}$

**2.** Evaluate

a)

$$\int (\sqrt{x} - 3)(2\sqrt{x} + 1) dx$$

b)

$$\int \frac{3x - x^2 + 5}{x^4} dx$$

c)

$$\int_0^{\pi/4} 2\sin(x) + 3\sec^2 x dx$$

**3.** Find absolute MAX/MIN for

a)  $f(x) = x + \frac{9}{x}$  on  $[1, 4]$

b)  $f(x) = x \cdot \sqrt{4 - x^2}$  on  $[-2, 2]$