The following problems will NOT be graded! The purpose is to understand the background of the class.

Draw the graphs of the following functions as much as you can. Mark the points that you think important to clarify the graph (such as x- or y- intercepts, or something else?).

1. (a) \( x = 1 \)

   ![Graph of \( x = 1 \)]

(b) \( y = 1 \)

   ![Graph of \( y = 1 \)]

2. (a) \( y = x \)

   ![Graph of \( y = x \)]

(b) \( y = -x \)

   ![Graph of \( y = -x \)]

3. \( y = |x| \)

   ![Graph of \( y = |x| \)]
5. (a) $y = x^2$

(b) $x = y^2$

6. $y = \sqrt{x}$
6. $xy = 1$ (equivalently, $y = 1/x$)

7. $y = e^x$

8. $y = \ln x$

9. $x^2 + y^2 = 1$

Circle centered at $(0,0)$ with radius $1.$
11. $y = \sin x$

12. $y = \cos x$

13. $y = \tan x$
15. Expand the series \[ \sum_{i=1}^{n} i, \] including at least first three terms and the last two terms.

\[ 1 + 2 + 3 + \cdots + (n-1) + n \]

16. Expand the following series

(a) \[ \sum_{i=1}^{n} i^2, \] including at least first three terms and the last two terms.

\[ \frac{2}{1} + \frac{1}{2} + \frac{2}{3} + \cdots + \frac{1}{(n-1)} + n^2 \]

(b) \[ \sum_{i=1}^{n^2} i, \] including at least first three terms and the last two terms.

\[ 1 + 2 + 3 + \cdots + (n-1) + n^2 \]

(c) What is the difference between the two series?

(a): Add only the perfect square terms
(b): Add from 1 to all the way till \( n^2 \).
17. Express the series $1 + 2 + 3 + \cdots + n$ in terms of $\sum_{i=1}^{n} \ast$ with appropriate numbers/characters/equations in $\ast$.

\[ \sum_{i=1}^{n} i \]

18. Express the following series in terms of $\sum_{i=1}^{n} \ast$ with appropriate numbers/characters/equations in $\ast$.

(a) $1^2 + 2^2 + 3^2 + \cdots + n^2$.

\[ \sum_{i=1}^{n} i^2 \]

(b) $1 + 2 + 3 + \cdots + n^2$ (What do you think the second last term is?).

\[ \sum_{i=1}^{n} i \]

(c) What is the difference between the two series?