Some thoughts and advice:

- You should expect to spend at least 1 – 2 hours on problem sets. A lot of practice problem-solving is essential to understand the material and skills covered in class. Be organised and do not leave problem sets until the last-minute. Instead, get a good start on the problems as soon as possible.

- When approaching a problem think about the following: *do you understand the words used to state the problem?* *what is the problem asking you to do?* *can you restate the problem in your own words?* *have you seen a similar problem worked out in class?* *is there a similar problem worked out in the textbook?* *what results/skills did you see in class that might be related to the problem?*

If you are stuck for inspiration, use the course piazza forum (accessible via the course Canvas site). However, don’t just ask for the solution - provide your thought process, the difficulties you are having, and ask a coherent question in complete English sentences. Remember the 3RA approach to asking questions outlined in the course syllabus.

- Form study groups - get together and work through problem sets together. **This will make your life easier!** However, you must write your solutions **on your own and in your own words**.

**You are not allowed** to use any additional resources (e.g. solution manuals, stackoverflow etc). If you are concerned then please ask.

- The problems in parentheses are for extra practice and optional (in particular, they do not need to be submitted). **Problems for submission are underlined.**

To gain mastery of a topic you should expect to attempt a significant proportion of the problems in the textbook (> 60%(!)).

- Answers to odd-numbered exercises are at the back of the textbook. However, you need to submit a worked solution and provide justification for how you determined the answer.

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**Read/recap:** §3.1


§3.1: (1), 2, 3, (4), 9, (15), 16, (17), 26, 34

**Problem A:**

1. Sketch the image curve of the path \( \mathbf{x}(t) = (t, t^4 - 2t^3 + 1) \).
2. Calculate the line tangent to \( \mathbf{x} \) at \( \mathbf{x}(3) \).
3. Determine a function \( f \) so that the image of \( \mathbf{x} \) equals the graph \( y = f(x) \) in the \( xy \)-plane.
4. Let \( g \) be a differentiable function defined for every \( \mathbb{R} \). Give a path \( \mathbf{z}(t) \) whose image curve equals the graph of \( g \).

**Problem B:**
1. Recall the **cycloid** from February 14 video (or see p.14 of the textbook). The cycloid can be realised as a parameterised curve $x(t)$.

Determine the velocity vector $v(t)$ of the cycloid. For which $t$ is $v(t) = 0$? Which points on the image of $x(t)$ satisfy $v(t) = 0$?

2. Determine a parameterised curve $x(t)$ whose image is the **hypocycloid** defined on p.80 of the textbook, with $a = 6, b = 5$. Which points on the image of $x$ satisfy $v(t) = 0$?