Clear communication is an important skill to practice, so simplify and justify all answers unless otherwise directed, show your work, and use proper notation.
1. The acceleration of an object at time $t$ is given by

$$a(t) = 20t^3 - 6t$$

(a) Give a general equation for the position of the object.

(b) At time $t = \frac{1}{5}$, is its velocity increasing or decreasing, or is there not enough information to know?
2. Use two iterations of Newton’s Method, starting with $x_0 = 0$, to approximate a root of $f(x) = x^3 + x + 1$. 
3. Use a linear approximation to find a reasonable rational number (i.e. a fraction of integers) approximating $\sqrt{30}$. 3
4. The function $f(x) = \text{arcsec}(x)$ is differentiable, with $f'(x) = \frac{1}{\sqrt{x^4 - x^2}}$.

Using this knowledge, find the derivative of $g(x) = \text{arcsec}(x^2 + x)$. You do not need to simplify your answer.

*Note: you’re not crazy—we have not talked about arcsecant in class. All you need to know about arcsecant to solve this problem is its derivative.*
5. Which of the previous questions did you get completely right? (2 bonus) Fill in the appropriate box(es).

☐ #1
☐ #2
☐ #3
☐ #4

☐ I didn’t get any of the questions completely right.