MATH 100, Fall, 2021
Tutorial #1
PreCalculus and some Calculus

Q1 (a) Find the domain and range (expressed in interval notation) of the function

$$f(x) = 2 + \sqrt{9 - x^2}.$$

(b) Make a rough sketch of the function $y = 2 - (x+1)^3$. Label all axis intercepts.

Q2 Find the exact (i.e. no decimal approximation!) value of $\cos(\frac{11\pi}{12})$:
(a) What are the exact values of $\cos\frac{\pi}{4}$, $\sin\frac{\pi}{4}$, $\cos\frac{2\pi}{3}$ and $\sin\frac{2\pi}{3}$?
(b) What is the exact value of $\cos(\frac{\pi}{4}+\frac{2\pi}{3})$? Explain (in words/equations) how this solves the problem first stated.

Q3 Sketch the functions $y = 3^x$ and $y = 7$. Solve for x: $3^x = 7$. State the exact value ($x =$) and a three-decimal approximation ($x \approx$) of the solution.

Q4 Let $f(x) = x^2 - x + 1$.
(a) Write out the expression $\dfrac{f(x+h) - f(x)}{h}$ and simplify as much as possible.
(b) For fixed x, find the limiting value of the expression in part (a) as $h \to 0$. There are at least two ways to do this. Make sure you see both.

Q5 The position s of a particle at time t is given by $s(t) = 2t^2 - t^3 + t - 7$.
(a) What is the average speed of the particle during the time interval $-2 \le t \le -1$?
(b) What is its instantaneous speed when $t = 1$?