LECTURE 3: PRACTICE PROBLEMS

(1) In this problem, let $f(x) = x^3$.
- Sketch the graph of $f(x)$. On the same set of axes, sketch the graph of $f^{-1}(x)$.

- Solve for $f^{-1}(x)$.

- Is $f^{-1}(x)$ a funtion? Explain.

(2) What is the inverse of $f(x) = e^{\tan(x)}$?

(3) What is the inverse of $f(x) = \sin(x^2 - 1)$?

(4) Verify $\arcsin\left(\dfrac{4-7e^x}{1-2e^x}\right)$ is the inverse of $\ln\left(\dfrac{\sin(x)-4}{2\sin(x)-7}\right)$ (don't worry about issues of domain).

(5) Suppose $\log_a(y) = 2$ and $\log_a(x) = 3$. What is $\log_a(x^2\sqrt[4]{y})$?

(6) Let $f(x) = x^2 - 2x$, and consider the point $(1, -1)$ on the graph of $f(x)$.

- For an arbitrary point $(x, f(x))$ on the graph of $f(x)$, find an expression for the slope of the secant line passing through $(1, -1)$ and $(x, f(x))$.

- What value are the slopes of the secant lines through $(1, -1)$ and $(x, f(x))$ approaching as x approaches 1? (Hint: You can either plug numbers close to 1 into your expression above, or you consider if your expression above simplifies for values of $x \neq 1$).