Math 201 - Quiz 1 (15 min)

Name: ____

Instructions: Write cleanly, show all work. Explain any trick questions.

1. (4 points) Find the domain and range of the function $f(x) = 3 - \sqrt{7-x}$

> **Solution:** Recall that $\sqrt{u}$ only exists if u is positive. In this case, the input of $\sqrt{}$ is $7-x$, so we want $7-x \geq 0$, or $7 \geq x$. This is the only way $f(x)$ could fail to exist, since the subtractions always make sense. So, the domain of $f(x)$ is all numbers less than or equal to 7. In interval notation, $(-\infty, 7]$.
>
> For the range, remember that by definition the output of $\sqrt{}$ is non-negative, and all non-positive numbers will occur (since every non-negative number is the square of some other number). So, $3 - \sqrt{7-x}$ will have as values 3 minus any non-negative number. This means that every number less than or equal to 3 will be taken as a value. In interval notation, the range is $(-\infty, 3]$.

2. (6 points) Given the following table, evaluate the expressions.

x	-2	-1	0	1	2
f(x)	1	3	0	2	5
g(x)	-1	6	3	-1	1

(a) $f\left(\sqrt{4-g(0)}\right)$

> **Solution:** Observe when we put 0 into g to get $g(0) = 3$. Then,
>
> $$\begin{aligned} f(\sqrt{4-g(0)}) &= f(\sqrt{4-3}) \\ &= f(\sqrt{1}) \\ &= f(1) \\ &= 2 \end{aligned}$$

(b) $f \circ f \circ f(-2)$

Solution:

$$\begin{aligned} f \circ f \circ f(-2) &= f(f(f(-2))) \\ &= f(f(1)) \\ &= f(2) \\ &= 5 \end{aligned}$$

(c) $g^{-1}(-1)$

Solution: This is the trick question: since $g(-2) = -1$, and $g(1) = -1$, the symbol $g^{-1}(-1)$ doesn't have a clear meaning. There is no 'inverse function' without specifying which values we choose if we have more than one option (like for $\sqrt{}$ we always choose the positive one. But we have to say that's what we mean.).