

Math 111 Quiz #6 Answers

1. (a) Here is one way to solve the equation. (There are other ways as well.)

Taking log (or the natural log) of both sides: $\log(3^{2x}) = \log(4(1.5^x))$

Using log properties 1 and 2: $2x \log 3 = \log 4 + x \log 1.5$

Subtracting $x \log 1.5$ to get the x terms on one side: $2x \log 3 - x \log 1.5 = \log 4$

Factoring x from the left side: $x(2 \log 3 - \log 1.5) = \log 4$

Dividing by $2 \log 3 - \log 1.5$: $x = \frac{\log 4}{2 \log 3 - \log 1.5}$

If you used natural log, the answer would be $x = \frac{\ln 4}{2 \ln 3 - \ln 1.5}$

- (b) Note that this is log base 10. Using the definition of logs or raising 10 by the powers of the left and the right hand side, we have that $x^2 + 1 = 10^2 \Rightarrow x^2 = 100 - 1 = 99$.

So, $x = \pm\sqrt{99}$ or $\pm 3\sqrt{11}$.

2. Solving $2 = (1.05)^t \Rightarrow t = \frac{\log 2}{\log 1.05}$ or $t = \frac{\ln 2}{\ln 1.05}$, which is approximately 14 years.

3. We need to have that $x - 11 > 0 \Rightarrow x > 11$.

So, the domain is $x > 11$ or $(11, \infty)$.

4. The function $f(x - 3) + 4$ is the same as $f(x)$ shifted right by 3 and up by 4.

Note that shifting up has no effect on the domain since the domain deals with the x -values of a function. So, the domain is only affected by shifting the function right by 3 units.

The new domain is will be $-2 + 3 \leq x \leq 5 + 3$ or $1 \leq x \leq 8$.