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QUIZ 1

MATH 200, SECTION 9
January 29, 2021

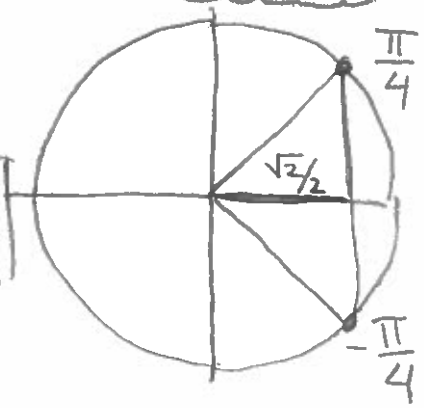
Directions: Closed book, closed notes, no calculators. Show work to get credit. Each problem is 5 points, for a total of 20 points.

By submitting this quiz you affirm that you agree with this statement: *On my honor, I have neither given nor received unauthorized aid on this assignment, and I pledge that I am in compliance with the VCU Honor System.*

1. Find all solutions of this equation: $2\cos(x) = \sqrt{2}$ $\longrightarrow \cos(x) = \frac{\sqrt{2}}{2}$

From the unit circle, the solutions are

$$x = \pm\frac{\pi}{4} + 2k\pi \text{ for } k = 0, \pm 1, \pm 2 \ldots$$



2. Suppose $f(x) = 3x + x^3$. Find $f^{-1}(14)$.

Note: $f(2) = 3 \cdot 2 + 2^3 = 6 + 8 = 14$

Because $f(2) = 14$, we get $\boxed{f^{-1}(14) = 2}$

3. Find the inverse this function: $f(x) = 3 + 2^x$

$y = 3 + 2^x$

$x = 3 + 2^y$

$x - 3 = 2^y$

$\ln(x-3) = \ln(2^y)$

$\ln(x-3) = y\ln(2)$

$y = \frac{\ln(x-3)}{\ln(2)}$

$$\boxed{f^{-1}(x) = \frac{\ln(x-3)}{\ln(2)}}$$

4. Write as a single logarithm: $\ln(x+1) - 3\ln(2x) + \ln(x^3)$

$= \ln(x+1) - \ln((2x)^3) + \ln(x^3)$

$= \ln(x+1) - \ln(8x^3) + \ln(x^3)$

$= \ln\left(\frac{x+1}{8x^3}\right) + \ln(x^3) = \ln\left(\frac{(x+1)x^3}{8x^3}\right) = \boxed{\ln\left(\frac{x+1}{8}\right)}$