Quiz 6
Math 111

Name: Key

Show *all* your work algebraically for each and simplify. No credit is given without supporting work.

1. [5] Solve for x in the following:
$2^{4x-1} = 3^{1-x}$

$\ln 2^{4x-1} = \ln 3^{1-x}$ (+1)

$(4x-1)\ln 2 = (1-x)\ln 3$ correctly w/ "(-)" (+1) tried prop (+1)

$4x\ln 2 - \ln 2 = \ln 3 - x\ln 3$

$4x\ln 2 + x\ln 3 = \ln 3 + \ln 2$ solved for x (+1)

$x = \dfrac{\ln 3 + \ln 2}{4\ln 2 + \ln 3}$

2. [5] Solve for x in the following:
$\log(x-16) = 2 - \log(x-1)$

$\log(x-16) + \log(x-1) = 2$

$\log(x-16)(x-1) = 2$

(+1) prop log used correctly / exp proposed

(+1) using exp function.

$(x-16)(x-1) = 10^2$

$x^2 - 17x + 16 = 100$

$x^2 - 17x - 84 = 0$

(+2) algebra

$(x-21)(x+4) = 0$

$\Rightarrow x = 21$ or ~~$x = -4$~~

↳ not in the domain (+1)

100 − 16 = 84

84: 1, 2, 42, 1, 2, 21

3. [2] Determine whether each of the following expressions are polynomials.

$x^3 + 3x^2 + \pi^x$ $\qquad$ $(x^2 + 5)(3x^2 - 2)$

nope. (+1) $\qquad$ yup. (+1)

4. [2] Find the remainder when $x^{10} + x^8$ is divided by $x - 1$.

using that thm...
remainder is $(1)^{10} + (1)^8 = 1 + 1 = 2$

5. [6] Use the fact that $(x - 1)$ is a factor of $x^3 + x^2 - 37x + 35$ to find all the *roots* of

$$f(x) = x^3 + x^2 - 37x + 35$$

note: this problem was based off of 4.2 #73 but the numbers were not cooked enough.

$$\begin{array}{r} x^2 + 2x - 35 \quad R0 \\ x-1 \overline{)\, x^3 + x^2 - 37x + 35} \\ -(x^3 - x^2) \\ \hline 2x^2 - 37x + 35 \\ -(2x^2 - 2x) \\ \hline -35x + 35 \\ -(-35x + 35) \\ \hline 0 \end{array}$$

Knew to divide (+1).
divided (+3)

$f(x) = (x-1)(x^2 + 2x - 35)$
$= (x-1)(x+7)(x-5)$ factored (+1)

So the roots are:
$1, -7, 5$
gave the roots. (+1)