Quiz 3 Name: ________________________________

1. Simplify—do not leave negative exponents in your answer.

\[
2(x^2 y^{-3})^3 = \quad \frac{4a^2b^{-6}}{8a^{-3}b^{-4}} =
\]

\[
\frac{3^{2/3} \cdot 9^{-1/2} \cdot 2^3}{2^{-2} \cdot 8^4} = \quad \log_3 (3^2 \cdot 9^{-1/2}) =
\]

\[
\log_2 \left( \frac{1}{16} \right) = \quad \log_{1/2} (4^3) =
\]

\[
\log_2 (2^{20}) = \quad \log_{1/2} \left( \frac{1}{2^{30}} \right) =
\]

2. Solve the \( x \) without the use of a calculator

\[
2^{4x-1} = 8 \quad 3^{x^2-x} - 9 = 0
\]

\[
\log_2 (3x + 5) = 3 \quad \ln (x + 5) - \ln (x + 6) = \ln 2
\]

3. Solve for \( x \). Give your answer accurate to four decimals.

\[
5^x = 60 \quad 3(2^x - 7) = 25
\]

\[
8e^{2x} - 156 = 44 \quad 8 \ln (x + 2) = 20
\]

\[
4e^{-0.2x} + 5 = 7 \quad 2^{4x+1} = 3^{x+4}
\]

\[
\frac{15}{1 + 4e^{-0.2x}} = 10
\]
4. The monthly demand for a new line of DVD players $t$ months after being in the market is said to be: $D(t) = 4000 - 3000e^{-0.06t}$.

(a) What is the demand after 1 month? two months?

(b) When will the demand reach 3000?

(c) At what level is the demand expected to stabilize?

5. When a camera flash goes off, the batteries immediately begin to recharge the flash’s capacitor, which stores the electric charge given by $Q(t) = \frac{10}{1 + 9e^{-9t/2}}$.

(a) What is the initial charge when the flash goes off?

(b) What is the maximum charge possible?

(c) How long does it take the battery to reach 90% of its maximum charge?

6. Determine the point(s) of intersection of the curves:

(a) $9x - 4y = 4$
$6x + 6y = 7$

(b) $p(x) = -x^2 - 5x + 12$
$p(x) = 2 - 8x$

7. If $f(x) = \frac{x}{x + 2}$, $g(x) = x^2 - 3x - 2$ and $h(x) = x^2 + 1$, determine:

$f(g(2)) =$ ____________  $g(f(2)) =$ ____________  
$h(g(x)) =$ ____________  $g(h(x)) =$ ____________