Directions: Please answer the following questions and make sure your answer are legible. You must show your work to receive credit for your answers. You may not use a calculator (or any other technology) on this quiz. Good Luck.

1. (7 points) Find the Quotient and Remainder: \((4y^4 + 3y^2 + 1) \div (2y^2 - y + 1)\).  

\[
\begin{align*}
2y^4 - y + 1 \\
\underline{4y^4 + 3y^2 + 1} \\
-4y^4 - \underline{2y^3 - 2y^2} \\
\underline{2y^4 + y^3 + 1} \\
-2y^4 + y^3 + y \\
\underline{-2y^4 - y^3 - y} \\
0
\end{align*}
\]

Q: 2y + y R: 0

2. (4 points) Factor \((y + 3)^2 - 4y^2\) completely over the integers.  

\[
\begin{align*}
y^2 + 6y + 9 - 4y^2 \\
= -3y^2 + 6y + 9 \\
= -3(y^2 - 2y - 3) \\
= -3(y - 3)(y + 1)
\end{align*}
\]

or 3(3-y)(y+1)

More Questions on the Back
3. (6 points) Solve the equation \( \frac{z}{2} = 4z^2 - 1 \).  

\[
Z = 8z^2 - 2, \\
0 = 8z^2 - Z - 2. 
\]

No quadratic or complex solutions.  

\[
z = 1 \pm \sqrt{1 - 4(8)(-3)} \\
\frac{3.8}{2} \\
z = 1 \pm \sqrt{1 + 64} \\
\frac{16}{16} \\
\]

4. (4 points) Use completion of squares to write the polynomial \( x^2 + 5x - 1 \) in the form \( a(x + b)^2 + c \).  

(Comp. Square \# 3)  

\[
\left(x^2 + 5x\right) - 1 \\
\left(x^2 + 5x + \frac{25}{4}\right) - \frac{25}{4} - 1 \\
\left(x + \frac{5}{2}\right)^2 - \frac{29}{4} \\
\left(x + \frac{5}{2}\right)^2 - \frac{29}{4} 
\]

5. (4 points) Perform the indicated operation and simplify \( b + \frac{1}{b-3} - 2 \).  

\[
\frac{b(b-3)}{b-3} + \frac{1}{b-3} + \frac{-2(b-3)}{b-3} \\
= b^2 - 3b + 1 - 2b + 6 \\
= \frac{b^2 - 5b + 7}{b-3} \\
= \frac{b^2 - 5b + 7}{b-3} 
\]
Directions: Please answer the following questions and make sure your answer are legible. You
must show your work to receive credit for your answers. You may not use a calculator (or any other
technology) on this quiz. Good Luck.

1. (7 points) Find the Quotient and Remainder: \((4y^4 + 3y^2 + 1) \div (2y^2 - y + 1)\) 
   
   \[
   \begin{array}{c}
   3y^2 - y + 1 \overline{) 4y^4 + 3y^2 + 1} \\
   3y^4 - 3y^3 + y^2 - y \\
   \hline
   \end{array}
   \]
   
   \(Q: 2y^2 + y + 1\)
   
   \(R: 0\)

2. (4 points) Factor \(x^4 + x^2 - 20\) completely over the integers. 
   
   \[u = x^2 \quad \Rightarrow \quad u^2 + 4 \]
   
   \[= (u + 5)(u - 4)\]
   
   \[= (x^2 + 5)(x^2 - 4)\]
   
   \[= (x^2 + 5)(x - 2)(x + 2)\]
3. (10 points) Solve the following equations:
   (a) \( y(y + 4) = 1 \) \hspace{1cm} (0.7 \# 6)
   (b) \( \frac{z}{2} = 4z^2 - 1 \) \hspace{1cm} (0.7 \# 7)

   \[ a) \quad y^2 + 4y - 1 = 0 \]

   \[ \text{comp D or quad} \]

   \[ (y^2 + 4y + 4) - 4 - 1 = 0 \]

   \[ (y + 2)^2 - 5 = 0 \]

   \[ (y + 2) = \pm \sqrt{5} \quad \text{or} \quad y + 2 = -\sqrt{5} \]

   \[ y = -2 + \sqrt{5} \quad \text{or} \quad y = -2 - \sqrt{5} \]

   \[ b) \quad z = 8z^2 - 2 \]

   \[ 0 = 8z^2 - z - 2 \]

   \[ z = \frac{1 \pm \sqrt{1 - 4(8)(-2)}}{2(8)} \]

   \[ z = 1 \pm \sqrt{1 + 64} \]

   \[ z = 1 \pm \frac{\sqrt{65}}{16} \quad \text{or} \quad z = 1 - \frac{\sqrt{65}}{16} \]

4. (4 points) Use completion of squares to write the polynomial \( 3x^2 + 6x + 1 \) in the form \( a(x+b)^2 + c \). (Comp.Square \# 4)

   \[ 3x^2 + 6x + 1 \]

   \[ = 3(x^2 + 2x) + 1 \]

   \[ = 3(x^2 + 2x + 1) - 1(3) + 1 \]

   \[ = 3(x + 1)^2 - 3 + 1 \]

   \[ = 3(x + 1)^2 - 2 \]
Directions: Please answer the following questions and make sure your answer are legible. You must show your work to receive credit for your answers. You may not use a calculator (or any other technology) on this quiz. Good Luck.

1. (7 points) Find the Quotient and Remainder: \((w^3 - 8) \div (5w - 10)\) \((0.5 \# 21)\)

\[
\begin{align*}
\frac{w^3}{5} + \frac{2}{3}w - \frac{4}{5} \\
5w - 10 \overbrace{w^3 + 0w^2 + 0w - 8}^\text{Q: } \frac{w^3}{5} + \frac{2}{3}w - \frac{4}{5} \\
- w^3 + 2w^2 \\
4w - 8 \\
- \quad 4w + r \\
\quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad 0
\end{align*}
\]

\[
\begin{align*}
\frac{w^3}{5} - \frac{w^2}{5}(5w - 10) \\
= w^3 - 2w^2 \\
\frac{2w^2}{5} = \frac{2w}{5} \\
\frac{2w}{5}(5w - 10) \\
= 2w^3 - 4w \\
\text{etc}
\end{align*}
\]

2. (4 points) Factor \((y + 3)^2 - 4y^2\) completely over the integers. \((0.6 \# 11)\)

\[
\begin{align*}
(y + 3)^2 - 4y^2 &= y^2 + 6y + 9 - 4y^2 \\
&= -3y^2 + 6y + 9 \\
&= -3(y^2 - 2y - 3) \\
&= -3(y - 3)(y + 1)
\end{align*}
\]

More Questions on Reverse!
3. (10 points) Solve the following equations:

(a) \[ \frac{z}{2} = 4z^2 - 1 \] (0.7 \# 7)

(b) \[ y(y + 4) = 1 \] (0.7 \# 6)

\[ \begin{align*}
& a) \quad z = 8z^2 - 2 \\
& \quad 0 = \frac{8z^2 - z - 2}{8} \\
& \quad z = \frac{1 \pm \sqrt{1 - 4(1)(-2)}}{2} \quad \text{compD or quad sol} \\
& \quad z = \frac{1 \pm \sqrt{65}}{16} \\
& \quad z = 1 + \frac{\sqrt{65}}{16} \quad \text{or} \quad z = 1 - \frac{\sqrt{65}}{16}
\end{align*} \]

\[ \begin{align*}
& b) \quad y^2 + 4y - 1 = 0 \\
& \quad (y^2 + 4y) - 1 = 0 \\
& \quad (y^2 + 4y + 4) - 1 = 0 \\
& \quad (y + 2)^2 - 5 = 0 \quad \text{so} \quad (y + 2)^2 = 5 \\
& \quad y + 2 = \sqrt{5} \quad \text{or} \quad y + 2 = -\sqrt{5} \\
& \quad y = -2 + \sqrt{5} \quad \text{or} \quad y = -2 - \sqrt{5}
\end{align*} \]

4. (4 points) Use completion of squares to write the polynomial \(2x^2 - x + 2\) in the form \(a(x+b)^2 + c\).

(Comp.Square \# 5)

\[ \begin{align*}
2x^2 - x + 2 & = \frac{1}{2} \left( 2 \frac{1}{2} x^2 - x + 2 \right) \\
& = \frac{1}{2} \left( (x - \frac{1}{4})^2 - \frac{1}{8} + \frac{16}{8} \right) \\
& = \frac{1}{2} \left( (x - \frac{1}{4})^2 + \frac{15}{8} \right)
\end{align*} \]