SN _____ ID _____ NAME _____

Show all necessary steps for full marks.

Question 1: (4 points): (R.3 Exercise 72): $[(2m+7)-n]^2$

Solution:

72. $[(2m+7)-n]^2$

$= (2m+7)^2 - 2(2m+7)(n) + n^2$

$= (4m^2 + 28m + 49) - 2(2m+7)(n) + n^2$

$= 4m^2 + 28m + 49 - 4mn - 14n + n^2$

Question 2: (4 points): (R.3 Example 12, page 28): Divide $3x^3 - 2x^2 - 150$ by $x^2 - 4$.

Write your answer as $\frac{Dividend}{Divisor} = Quotient + \frac{Remainder}{Divisor}$

Solution:

$$
\begin{array}{r|l}
 & 3x - 2 \\
\hline
x^2 - 4 & 3x^3 - 2x^2 - 150 \\
 & 3x^3 - 12x \\
 & - \quad + \\
\hline
 & -2x^2 + 12x - 150 \\
 & -2x^2 + 8 \\
 & + \quad - \\
\hline
 & 12x - 158
\end{array}
$$

$$\frac{3x^3 - 2x^2 - 150}{x^2 - 4} = 3x - 2 + \frac{12x - 158}{x^2 - 4}$$

Another Method:

$$
\begin{array}{r}
 \qquad\qquad\qquad\qquad\qquad\qquad \text{Missing term} \\
 \qquad\qquad\quad 3x - 2 \qquad\qquad\quad \downarrow \\
\hline
x^2 + 0x - 4 \,\big)\, 3x^3 - 2x^2 + 0x - 150 \qquad \text{Insert placeholders for missing terms.} \\
\text{Missing term} \uparrow \qquad 3x^3 + 0x^2 - 12x \\
\hline
 \qquad\qquad\quad -2x^2 + 12x - 150 \\
 \qquad\qquad\quad -2x^2 + 0x + 8 \\
\hline
 \qquad\qquad\quad 12x - 158 \leftarrow \text{Remainder}
\end{array}
$$

Question 3: (4 points): (R.4 Exercise 32 and 40): Factor

(a): $36x^3 + 18x^2 - 4x$

(b): $18x^5 + 15x^4 z - 75x^3 z^2$

Solution:

(a):

32. Factor out the greatest common factor, $2x$:

$36x^3 + 18x^2 - 4x = 2x(18x^2 + 9x - 2)$. Now factor the trinomial by trial and error:

$18x^2 + 9x - 2 = (6x-1)(3x+2)$. Thus,

$36x^3 + 18x^2 - 4x = 2x(6x-1)(3x+2)$.

(b):

40. First, factor out the greatest common factor, $3x^3$:

$$18x^5+15x^4z-75x^3z^2=3x^3\left(6x^2+5xz-25z^2\right)$$

Now factor the trinomial by trial and error: $6x^2+5xz-25z^2=(3x-5z)(2x+5z)$

Thus,

$$\begin{aligned}18x^5+15x^4z-75x^3z^2&=3x^3\left(6x^2+5xz-25z^2\right)\\&=3x^3(3x-5z)(2x+5z)\end{aligned}$$

Question 4: (4 points): (R.4 Exercise 96 and 97): Factor

(a): $q^2+6q+9-p^2$

(b): $64+(3x+2)^3$

Solution: (a):

96.
$$\begin{aligned}q^2+6q+9-p^2&=(q^2+6q+9)-p^2\\&=\left[q^2+2(q)(3)+3^2\right]-p^2\\&=(q+3)^2-p^2\\&=[(q+3)+p][(q+3)-p)]\\&=(q+3+p)(q+3-p)\end{aligned}$$

(b):

97.
$$\begin{aligned}&64+(3x+2)^3\\&=4^3+(3x+2)^3\\&=\left[4+(3x+2)\right]\left[4^2-(4)(3x+2)+(3x+2)^2\right]\\&=\left[4+(3x+2)\right]\left[\begin{array}{l}4^2-(4)(3x+2)\\\quad+9x^2+12x+4\end{array}\right]\\&=(4+3x+2)\left(16-12x-8+9x^2+12x+4\right)\\&=(3x+6)\left(9x^2+12\right)\\&=3(x+2)(3)\left(3x^2+4\right)=9(x+2)\left(3x^2+4\right)\end{aligned}$$