Math 5071 - Problem Set 1

(1) c = price of a computer ($)
p = price of a printer ($)

$$\boxed{\$6{,}400 = 6c + 2p}$$

(2) r = radius of Earth
s = surface area of Earth
V = volume of Earth

$$\boxed{r = \frac{3V}{S}}$$

(3) x = a number

$6 + 4x = 50$
$-6 \qquad -6$
$4x = 44 \qquad \boxed{x = 11}$

(4) $(2b + 4c)^a$
$a = 3$
$b = 5$
$c = -2$

$(2 \cdot 5 + 4 \cdot {}^-2)^3 = (10 + {}^-8)^3 = 2^3 = \boxed{8}$

(5) $\dfrac{ab}{cd}$

(6) $(2x - 7y) + (-4x - 2y)$
$= 2x - 4x + -7y - 2y$
$\boxed{= -2x - 9y}$

(7) $4x^2 + (x + x^2)(-2) - 3x - 5x^2 - 8x^2 - 13x(-21) + 34$
$\boxed{= -8x^2 + 19x - 23}$

(8) $2(3p + 4q - 2r) + 3(-3p - 2q + r)$
$= 6p + 8q - 4r - 9p - 6q + 3r$
$\boxed{= -3p + 2q - r}$

(9) $\boxed{5xy - 6x + 3y}$

(10) $a(-4b + 2c) - 3ac + 10(ab + ac)$
$= -4ab + 2ac - 3ac + 10ab + 10ac$
$\boxed{= 6ab + 9ac}$

(11) $(2y - x)(2y - x)(2y - x)(2y - x)$

(12) $(2x)^6$

(13) $(-5rs^{-8}) \cdot (-8r^2s^2) \cdot (-4r^5s^{15})$
$\boxed{= -160r^4s^9}$

(14) $\dfrac{5fg^{52}}{f^{-5}g^{32}} = \boxed{5f^6g^{20}}$

(15) $\dfrac{m^6(n^{-40})^3}{(n^2)^{-39}m^{-2}} = \dfrac{m^6n^{-120}}{n^{-78}m^{-2}}$

$= m^8n^{-42} = \boxed{\dfrac{m^8}{n^{+42}}}$

(16) $-x^2(x^2 - 6x + 5) = \boxed{-x^4 + 6x^3 - 5x^2}$

(17) $mn^2(2m^2 - mn - n^2) = \boxed{2m^3n^2 - m^2n^3 - mn^4}$

(18) $(2x + 9)(5x + 1)$ FOIL
$10x^2 + 2x + 45x + 9 = \boxed{10x^2 + 47x + 9}$

(19) $(a - b)^2 = (a - b)(a - b)$ FOIL
$a^2 - ab - ab + b^2 = \boxed{a^2 - 2ab + b^2}$

(20) $(a^2 - ab + b^2)(a + b)$

	a^2	$-ab$	$+b^2$
a	a^3	$-a^2b$	$+ab^2$
$+b$	$+a^2b$	$-ab^2$	$+b^3$

$= a^3 - \cancel{a^2b} + \cancel{ab^2} + \cancel{a^2b} - \cancel{ab^2} + b^3$
$\boxed{= a^3 - b^3}$

PS1 continued

(21) $(2x^4+5x^2+6x-1)\div(x+1)$ $=$ $\boxed{2x^3-x^2+6x \quad R1 \quad \text{or} \quad 2x^3-x^2+6x \ \frac{-1}{x+1}}$

$$
\begin{array}{r|l}
 & 2x^3 - x^2 + 6x \\
\hline
x+1 & 2x^4 + 0x^3 + 5x^2 + 6x - 1 \\
 & -(2x^4 + x^3) \\
\hline
 & 0 - x^3 + 5x^2 \\
 & -(-x^3 - x^2) \\
\hline
 & 0 + 6x^2 + 6x \\
 & -(6x^2 + 6x) \\
\hline
 & 0 + 0 - 1 \quad \text{remainder}
\end{array}
$$

(22) $12x^3-13x^2-23x+24 \div 4x-4 = \boxed{3x^2-\frac{1}{4}x-6}$

$$
\begin{array}{r|l}
 & 3x^2 - \frac{1}{4}x - 6 \\
\hline
4x-4 & 12x^3 - 13x^2 - 23x + 24 \\
 & -(12x^3 - 12x^2) \\
\hline
 & 0 - x^2 - 23x \\
 & -(-x^2 + x) \\
\hline
 & 0 - 24x + 24 \\
 & -(-24x + 24) \\
\hline
 & 0 + 0 \quad R0
\end{array}
$$

(23) $\dfrac{-x^4+7x^3+4x^2-6x-8}{x-1}$

$$
\begin{array}{r|l}
 & -x^3 + 6x^2 + 10x + 4 \\
\hline
x-1 & -x^4 + 7x^3 + 4x^2 - 6x - 8 \\
 & -(-x^4 + x^3) \\
\hline
 & 0 + 6x^3 + 4x^2 \\
 & -(+6x^3 - 6x^2) \\
\hline
 & 0 + 10x^2 - 6x \\
 & -(+10x^2 - 10x) \\
\hline
 & 0 + 4x - 8 \\
 & -(4x - 4) \\
\hline
 & 0 - 4 \leftarrow \text{remainder}
\end{array}
$$

$= -x^3+6x^2+10x+4 \ R-4$ or $-x^3+6x^2+10x+4 \ \frac{-4}{x-1}$

(24) $(x^6-1)\div(x^2-1)$

$$
\begin{array}{r|l}
 & x^4 + x^2 + 1 \\
\hline
x^2+0x-1 & x^6 + 0x^5 + 0x^4 + 0x^3 + 0x^2 + 0x - 1 \\
 & -(x^6 + 0x^5 - x^4) \\
\hline
 & 0 + 0 + x^4 + 0x^3 + 0x^2 \\
 & -(x^4 + 0x^3 - x^2) \\
\hline
 & 0 + 0 + x^2 + 0x - 1 \\
 & -(x^2 + 0x - 1) \\
\hline
 & 0 \quad 0 \quad 0
\end{array}
$$

$\boxed{= x^4 + x^2 + 1}$