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5 IV TEST SOLUTIONS 12/9/19

① (i) $x^2 + 6x + 8$
 $= (x + 4)(x + 2)$ (5)

(ii) $x^2 - 7xy + 12y^2$
 $= (x - 4y)(x - 3y)$ (5)

(iii) $x^2y^2 - 36y^4$
 $= y^2(x^2 - 36y^2)$
 $= \boxed{y^2(x - 6y)(x + 6y)}$ (5)

(iv) $8a^3 - 27d^3$
 $= (2a)^3 - (3d)^3$
 $= \boxed{(2a - 3d)(4a^2 + 6ad + 9d^2)}$ (5)

② (i) $\frac{3}{x} - \frac{2}{x+1} + \frac{2}{x^2}$
 $= \frac{3(x)(x+1) - 2(x^2) + 2(x+1)}{x^2(x+1)}$
 $= \frac{3x^2 + 3x - 2x^2 + 2x + 2}{x^2(x+1)}$
 $= \boxed{\frac{x^2 + 5x + 2}{x^2(x+1)}}$ (15)

(ii) $\frac{9-x^2}{x^4+6x^3} \div \frac{x^3-2x^2-3x}{x^2+7x+6}$
 $= \frac{9-x^2}{x^4+6x^3} \times \frac{x^2+7x+6}{x^3-2x^2-3x}$

$$= \frac{(3-x)(3+x)}{x^3(x+6)} \times \frac{(x+6)(x+1)}{(x)(x^2-2x-3)}$$

$$= \frac{(3-x)(3+x)}{x^3} \times \frac{(x+1)}{x(x-3)(x+1)}$$

$$= \boxed{\frac{-3-x}{x^4}}$$

(15)

$$(iii) \frac{\frac{1}{x} + 1}{\frac{1}{x} - 1} - \frac{x}{x} = \boxed{\frac{1+x}{1-x}}$$

(5)

$$(3) \frac{1}{f} = \frac{1}{p} + \frac{1}{q} \quad \times f p q$$

$$\therefore p q = f q + f p$$

$$\therefore p q - f p = f q$$

$$\therefore p(q-f) = f q$$

$$\therefore \boxed{p = \frac{f q}{q-f}}$$

(15)

$$(4) x^3 + 2x^2 + kx + 2 = x^3 + ax^2 - 2x - x^2 - ax + 2$$

$$2 = a - 1$$

$$\therefore \boxed{a = 3}$$

$$k = -2 - a$$

$$\therefore k = -2 - 3$$

$$\boxed{k = -5}$$

(15)

$$\textcircled{5} \quad 2x^3 + 2p x^2 - 2bc x - bc^2 - p x + 1 = 2x^3 + a x^2 - 5bc x + 1$$

$$\left. \begin{aligned} 2p - 1 &= a \quad \textcircled{1} \\ -2 - p &= -b \\ \therefore -2 + b &= p \quad \textcircled{2} \end{aligned} \right\}$$

Sub $\textcircled{2}$ in $\textcircled{1}$

$$2(-2 + b) - 1 = a$$

$$\therefore -4 + 2b - 1 = a$$

$$\therefore \boxed{2b - 5 = a}$$

$\textcircled{15}$