CH # 2

Formula used:

(Ex. 2.5) $\left(a^y = x \rightarrow y = \log_a x. \right)$

Date:

① $5^3 = 125$

Sol

$5^3 = 125$

$\boxed{\log_5 125 = 3}$

② $7^2 = 49$

$7^2 = 49$

$\boxed{2 = \log_7 49}$

③ $3^4 = 81.$

$3^4 = 81$

$\boxed{4 = \log_3 81}$

④ $2^7 = 128$

$2^7 = 128$

$\boxed{7 = \log_2 128}$

⑤ $3^{-2} = 1/9$

$\boxed{\log_3 (1/9) = -2}$

⑥ $(5/4)^{-2} = \frac{16}{25}$

$\boxed{-2 = \log_{5/4}\left(\frac{16}{25}\right)}$

⑦ $\log_2 32 = 5$

$\boxed{2^5 = 32}$

⑧ $\log_3 81 = 4$

$\boxed{3^4 = 81}$

⑨ $\ln \frac{1}{e} = -1$

$\boxed{e^{-1} = \frac{1}{e}}$

⑩ $\log_2 1/8 = -3$

$\boxed{2^{-3} = \frac{1}{8}}$

⑪ $\log 100{,}000 = 5$

$\boxed{10^5 = 100{,}000}$

⑫ $\log 0.001 = -3$

$\boxed{10^{-3} = 0.001}$

⑬ $\log_8 64.$

let

$x = \log_8 64$

$8^x = 64$

$8^x = 8^2$

$\boxed{x = 2}$

⑭ $\log_9 81$

let

$x = \log_9 81$

$9^x = 81$

$9^x = 9^2$

$\boxed{x = 2}$

⑮ $\log_4 64$

let

$x = \log_4 64$

$4^x = 64$

$4^x = 4^3$

$\boxed{x = 3}$

⑯ $\log_3 27$

let

$x = \log_3 27$

$3^x = 27$

$3^x = 3^3$

$\boxed{x = 3}$

⑰ $\log_2 \frac{1}{16}$

let

$x = \log_2 \frac{1}{16}$

$2^x = \frac{1}{16}$

$2^x = \frac{1}{2^4}$

$2^x = 2^{-4}$

$\boxed{x = -4}$

⑱ $\log_3 \frac{1}{81}$

let

$x = \log_3 \frac{1}{81}$

$3^x = \frac{1}{81}$

$3^x = \frac{1}{3^4}$

$3^x = 3^{-4}$

$\boxed{x = -4}$

⑲ $\log_2 \sqrt[3]{\frac{1}{4}}$

let

$x = \log_2 \sqrt[3]{\frac{1}{4}}$

$2^x = \left(\frac{1}{4}\right)^{1/3}$

$2^x = (2^{-2})^{1/3}$

$2^x = 2^{-2/3}$

$\boxed{x = -2/3}$

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(Using formula at last: (37 on-ward)

$\log_a x = \frac{\ln x}{\ln a}$ Date:

(20) $\log_8 \sqrt[4]{\frac{1}{2}}$

let $x = \log_8 \sqrt[4]{\frac{1}{2}}$

$8^x = \left(\frac{1}{2}\right)^{1/4}$

$8^x = 2^{-1/4}$

$2^{3x} = 2^{-1/4}$

$3x = -1/4$

$\boxed{x = -\frac{1}{12}}$

(21) $\ln e$

let

$\ln_e e = 1$.

$e^1 = e^x$

$\boxed{x = 1}$

(22) $\ln e^3$

$\ln_e e^3 = x$

$e^x = e^3$

$\boxed{x = 3}$

(23) $\ln e^{5/3}$

$\ln_e e^{5/3} = x$

$e^x = e^{5/3}$

$\boxed{x = 5/3}$

(24) $\ln 1$

$\ln_e 1 = x$

$e^x = 1$

$e^x = e^0$

$\boxed{x = 0}$

(27) $\log_5 (3k)$

$\boxed{\log_5 3 + \log_5 k}$.

(28) $\log_9 (4m)$

$\boxed{\log_9 4 + \log_9 m}$.

(29) $\log_3 \frac{3P}{5K}$

$\log_3 3 + \log_3 P - \log_3 5 + \log_3 K$.

$1 + \log_3 P - \log_3 5 + \log_3 K$.

$1 + \log_3 P - \log_3 5 + \log_3 k$

(30) $\log_7 \frac{15P}{7y}$

Sol:

$\log_7 15 + \log_7 P - \log_7 7 + \log_7 y$

$\boxed{\log_7 15 + \log_7 P - 1 + \log_7 y}$

(31) $\ln \frac{3\sqrt{5}}{\sqrt[3]{6}}$

$\ln 3 + \ln(5)^{1/2} - \ln(6)^{1/3}$

$\boxed{\ln 3 + \frac{1}{2}\ln 5 - \frac{1}{3}\ln 6}$.

(32) $\ln \frac{9\sqrt[3]{5}}{\sqrt[4]{3}}$

Sol

$\ln 9 + \ln(5)^{1/3} - \ln(3)^{1/4}$

$\boxed{\ln 9 + \frac{1}{3}\ln 5 - \frac{1}{4}\ln 3}$

(33) $\log_b 32$.

$\log_b 2^5$

$5\log_b 2$

$\boxed{5a}$

(34) $\log_b 18$

$\log_b 3^2 \cdot 2$

$2\log_b 3 + \log_b 2$

$\boxed{2c + a}$.

(35) $\log_b (72b)$

$\log_b 72 + \log_b b$.

$\log_b 2^3 \cdot 3^2 + 1$

$\log_b 2^3 + \log_b 3^2 + 1$

$3\log_b 2 + 2\log_b 3 + 1$

$\boxed{3a + 2c + 1}$

(36) $\log_b (9b^2)$

$\log_b 9 + \log_b b^2$

$\log_b 3^2 + 2\log_b b$

$2\log_b 3 + 2(1)$

$\boxed{2c + 2}$

(37) $\log_5 30$

$= \frac{\ln 30}{\ln 5} \approx \frac{3.40}{1.60} \approx \boxed{2.125}$

(38) $\log_{12} 210$

$= \frac{\ln 210}{\ln 12} \approx \frac{5.347}{2.485} \approx \boxed{2.1517}$

(39) $\log_{1.2} 0.95$

$= \frac{\ln 0.95}{\ln 1.2} \approx \frac{-0.05}{0.18} \approx \boxed{-0.28}$

(40) $\boxed{\log_{2.8} 0.12}$ on next page

$= \cancel{\frac{\ln 2.8}{\ln 0.12}} \approx \cancel{\frac{1.029}{-2.12}} \approx \cancel{-0.}$

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Date:

(40) $\log_{2.8} 0.12$

$\frac{\ln 0.12}{\ln 2.8} \approx \frac{-2.12}{1.029} \approx \boxed{-2.060}$

(41) $\log_x 36 = -2$

$x^{-2} = 36$

$(x^{-2})^{-1/2} = (36)^{-1/2}$

$x = \frac{1}{\sqrt{36}}$

$x = \frac{1}{(6^2)^{1/2}} \Rightarrow \boxed{\frac{1}{6}}$

(42) $\log_9 27 = m$

$\log_9 (9 \cdot 3) = m$

$\log_9 9 + \log_9 3 = m$

$1 + \frac{1}{2} = m$

$\boxed{m = 3/2}$

OR

$\log_9 27 = m$

$9^m = 27$

$3^{2m} = 3^3$

$2m = 3$

$\boxed{m = \frac{3}{2}}$

(43) $\log_8 16 = z$

$8^z = 16$

$2^{3z} = 2^4$

$3z = 4$

$\boxed{z = 4/3}$

(44) $\log_y 8 = \frac{3}{4}$

$y^{3/4} = 8$

$(y^{3/4})^{4/3} = 8^{4/3}$

$y = 8^{4/3}$

$y = (2^3)^{4/3}$

$\boxed{y = 2^4 = 16}$

(45) $\log_r 5 = \frac{1}{2}$

$(r^{1/2})^2 = (5)^2$

$r = (\sqrt{5})^2$

$\boxed{r = 25}$

(46) $\log_4 (5x+1) = 2$

$4^2 = 5x+1$

$5x + 1 = 16$

$5x = 16 - 1$

$5x = 15$

$x = 15/5$

$\boxed{x = 3}$

(47) $\log_5 (9x-4) = 1$

$9x - 4 = 5$

$9x = 9$

$\boxed{x = 1}$

(48) $\log_4 x - \log_4 (x+3) = -1$

$\log_4 \frac{x}{x+3} = -1$

$4^{-1} = \frac{(x)}{(x+3)}$

$\frac{1}{4} = \frac{x}{x+3}$

$4x = x + 3$

$4x - x = 3$

$3x = 3$

$\boxed{x = 3/3 = 1}$

(49) $\log_9 m - \log_9 (m-4) = -2$

$\log_9 \left(\frac{m}{m-4}\right) = -2$

$9^{-2} = \frac{m}{m-4}$

$\frac{1}{9^2} = \frac{m}{m-4}$

$\frac{1}{81} = \frac{m}{m-4}$

$81m = m - 4$

$80m = -4$

$m = -4/80$

$\boxed{m = -1/20}$

(50) $\log(x+5) + \log(x+2) = 1$

$\log(x+5)(x+2) = 1$

$10 = (x+5)(x+2)$

$\cancel{10} = x^2 + 7x + \cancel{10}$

$x(x+7) = 0$

$\boxed{x = 0}, \boxed{x = -7}$

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$e^2 = 7.389 / e = 2.718$ Date:

(51) $\log_3(x-2) + \log_3(x+6) = 2$

$\log_3(x-2)(x+6) = 2$

$3^2 = (x-2)(x+6)$

$9 = x^2 + 6x - 2x - 12$

$9 = x^2 + 4x - 12$

$x^2 + 4x - 21 = 0$

$x^2 + 7x - 3x - 21 = 0$

$x(x+7) - 3(x+7) = 0$

$(x+7)(x-3) = 0$

$\boxed{x = -7}$, $\boxed{x = 3}$

(52) $\log_3(x^2+17) - \log_3(x+5) = 1$

$\log_3 \frac{(x^2+17)}{(x+5)} = 1$

$3 = \frac{x^2+17}{x+5}$

$3x + 15 = x^2 + 17$

$x^2 - 3x + 2 = 0$

$x^2 - 2x - x + 2 = 0$

$(x-2)(x-1) = 0$

$\boxed{x = 2}$, $\boxed{x = 1}$

(53) $\log_2(x^2-1) - \log_2(x+1) = 2$

$\log_2 \frac{(x^2-1)}{(x+1)} = 2$

$2^2 = \frac{x^2-1}{x+1}$

$4 = \frac{(x-1)\cancel{(x+1)}}{\cancel{(x+1)}}$

$x = 4 + 1$

$\boxed{x = 5}$

(54) $\ln_e(5x+4) = 2$

$e^2 = 5x + 4$

$5x = e^2 - 4$

$x = \frac{e^2-4}{5}$

$\boxed{x \approx 0.6778}$

(55) $\ln x + \ln 3x = -1$

$\ln(x)(3x) = -1$

$\ln_e 3x^2 = -1$

$e^{-1} = 3x^2$

$x^2 = \frac{e^{-1}}{3}$

$x = \sqrt{\frac{e^{-1}}{3}}$

$x = \frac{1}{\sqrt{3e}}$

$\boxed{x \approx 0.3502}$

(56) $\ln(x+1) - \ln x = 1$

$\ln \frac{(x+1)}{x} = 1$

$e^1 = \frac{x+1}{x}$

$ex = x + 1$

$x - ex = -1$

$x(1-e) = -1$

$x = \frac{-1}{1-e}$

$\boxed{x \approx 0.582}$

(57) $2^x = 6$

Taking log on b.s

$x \log 2 = \log 6$

$x = \frac{\log 6}{\log 2}$

$x = \frac{0.77}{0.30}$ $\boxed{\approx 2.57}$

(58) $5^x = 12$

$x \log 5 = \log 12$

$x = \frac{\log 12}{\log 5}$

$\boxed{x \approx 1.55}$

(59) $e^{k-1} = 6$

$\log_e e^{k-1} = \log 6$

$(k-1)\log e = \log 6$

$k - 1 = \frac{\log 6}{\log e} = \frac{0.778}{0.435}$

$k - 1 = 1.78$

$k = 1.78 + 1$

$\boxed{k = 2.78}$

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(60) $e^{2y} = 15$

$\log_e e^{2y} = \log 15$

$2y \log e = \log 15$

$2y = \frac{\log 15}{\log e}$

$2y = \ln 15$

$2y = 2.708$

$y = 2.708/2$

$\boxed{y = 1.354}$

(61) $3^{x+1} = 5^x$

$\ln 3^{x+1} = \ln 5^x$

$(x+1)\ln 3 = x \ln 5$

$x \cdot \ln 3 + \ln 3 = x \cdot \ln 5$

$x \cdot \ln 3 - \ln 5 \cdot x = -\ln 3$

$x(\ln 3 - \ln 5) = -\ln 3.$

$x = \frac{-\ln 3}{\ln 3 - \ln 5}$

$x \approx \frac{-1.0986}{1.0986 - 1.6094}$

$x \approx \frac{\cancel{-}1.0986}{\cancel{-}0.5108}$

$\boxed{x \approx 2.1507}$

(62) $2^{x+1} = 6^{x-1}$

$\ln 2^{x+1} = \ln 6^{x-1}$

$(x+1)\ln 2 = (x-1)\ln 6$

$x \cdot \ln 2 + \ln 2 = x \cdot \ln 6 - \ln 6$

$\cancel{x(\ln 6 - \ln 2) = \ln 2}$

$x(\ln 2 - \ln 6) = -\ln 6 - \ln 2$

$x = \frac{-\ln 6 - \ln 2}{\ln 2 - \ln 6}$

$x = \frac{-1.792 - 0.693}{0.693 - 1.792}$

$x = \frac{\cancel{-}2.485}{\cancel{-}1.099}$

$\boxed{x \approx +2.2619}$

(63) $5(0.10)^x = 4(0.12)^x$

$\frac{5}{4} = \left(\frac{0.12}{0.10}\right)^x$

$1.25 = (1.2)^x$

neutral log.

$\ln 1.25 = x \ln 1.2$

$x = \frac{\ln 1.25}{\ln 1.2}$

$x = \frac{0.223}{0.182}$

$\boxed{x \approx 1.2253}$

(64) $1.5(1.05)^x = 2(1.01)^x$

$\frac{1.5}{2} = \left(\frac{1.01}{1.05}\right)^x$

$0.75 = (0.962)^x$

$\ln 0.75 = x \ln 0.962$

$x = \frac{\cancel{\ln 0.962}}{\cancel{\ln 0.75}} \cdot \frac{\ln 0.75}{\ln 0.962}$

$x = \frac{\cancel{-0.0388}}{\cancel{-0.288}} \cdot \frac{\cancel{-}0.288}{\cancel{-}0.0388}$

$\boxed{x \approx 7.423}$

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CH # 3

Date:

(Ex. 3.1)

(31) $\lim_{x\to 3} \frac{x^2-9}{x-3}$

$\lim_{x\to 3} \frac{(x+3)\cancel{(x-3)}}{\cancel{(x-3)}}$

$\lim_{x\to 3} (x+3)$

Rule No. 7 from book.

$= 3+3$

$= \boxed{6}$

(32) $\lim_{x\to 2} \frac{x^2-4}{x+2}$

$\lim_{x\to 2} \frac{(x-2)\cancel{(x+2)}}{\cancel{(x+2)}}$

$\lim_{x\to 2} (x-2)$

Rule No. 7

$= 2-2$

$\boxed{= 0}$

(33) $\lim_{x\to 1} \frac{5x^2-7x+2}{x^2-1}$

$\lim_{x\to 1} \frac{5x^2-5x-2x+2}{(x^2-1)}$

$\lim_{x\to 1} \frac{5x(x-1)-2(x-1)}{(x-1)(x+1)}$

$\lim_{x\to 1} \frac{(5x-2)\cancel{(x-1)}}{\cancel{(x-1)}(x+1)}$

$\lim_{x\to 1} \frac{(5x-2)}{(x+1)}$

$\frac{5(1)-2}{1+1} = \boxed{\frac{3}{2}}$

(34) $\lim_{x\to 3} \frac{x^2-9}{x^2+x-6}$

$\lim_{x\to 3} \frac{(x-3)(x+3)}{x^2+3x-2x-6}$

$\lim_{x\to 3} \frac{(x-3)(x+3)}{x(x+3)-2(x+3)}$

$\lim_{x\to 3} \frac{(x-3)\cancel{(x+3)}}{(x-2)\cancel{(x+3)}}$

$\frac{3-3}{3-2} = \frac{0}{1} = \boxed{0}$

(35) $\lim_{x\to 2} \frac{x^2-x-6}{x+2}$

$\lim_{x\to 2} \frac{x^2-3x+2x-6}{x+2}$

$\lim_{x\to 2} \frac{x(x-3)+2(x-3)}{(x+2)}$

$\lim_{x\to 2} \frac{\cancel{(x+2)}(x-3)}{\cancel{(x+2)}}$

$2-3 = \boxed{-1}$

(36) $\lim_{x\to 5} \frac{x^2-3x-10}{x-5}$

$\lim_{x\to 5} \frac{x^2-5x+2x-10}{x-5}$

$\lim_{x\to 5} \frac{x(x-5)+2(x-5)}{(x-5)}$

$\lim_{x\to 5} \frac{(x+2)\cancel{(x-5)}}{\cancel{(x-5)}}$

$5+2 = \boxed{7}$

(37) $\lim_{x\to 0} \frac{1/(x+3) - 1/3}{x}$

$\lim_{x\to 0} \frac{\frac{3-(x+3)}{3(x+3)}}{x}$

$\lim_{x\to 0} \frac{3-(x+3)}{3x(x+3)}$

$\lim_{x\to 0} \frac{\cancel{3}-\cancel{x}-\cancel{3}}{3\cancel{x}(x+3)}$

$\lim_{x\to 0} \frac{-1}{(x+3)3}$

$\frac{-1}{3(0+3)} = \boxed{-1/9}$

(38) $\lim_{x\to 0} \frac{-1/x+2 + 1/2}{x}$

$\lim_{x\to 0} \frac{\frac{-2+x+2}{2(x+2)}}{x}$

$\lim_{x\to 0} \frac{-\cancel{2}+\cancel{x}+\cancel{2}}{2\cancel{x}(x+2)}$

$\frac{1}{2(0+2)} = \boxed{\frac{1}{4}}$

(39) $\lim_{x\to 25} \frac{\sqrt{x}-5}{x-25}$

$\lim_{x\to 25} \frac{\sqrt{x}-5}{x-25} \cdot \frac{\sqrt{x}+5}{\sqrt{x}+5}$

$\lim_{x\to 25} \frac{x-25}{(x-25)(\sqrt{x}+5)}$

$\lim_{x\to 25} \frac{\cancel{x-25}}{\cancel{(x-25)}(\sqrt{x}+5)}$

$\lim_{x\to 25} \frac{1}{\sqrt{x}+5}$

$\frac{1}{\sqrt{25}+5}$

$\frac{1}{5+5} = \boxed{\frac{1}{10}}$

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Date:

(40) $\lim_{x\to 36} \frac{\sqrt{x}-6}{x-36}$

$\lim_{x\to 36} \frac{\sqrt{x}-6}{x-36} \cdot \frac{\sqrt{x}+6}{\sqrt{x}+6}$

$\lim_{x\to 36} \frac{\cancel{x-36}}{(\cancel{x-36})(\sqrt{x}+6)}$

$\lim_{x\to 36} \frac{1}{\sqrt{x}+6}$

$\frac{1}{\sqrt{36}+6} = \frac{1}{6+6} = \boxed{\frac{1}{12}}$

(41) $\lim_{h\to 0} \frac{(x+h)^2-x^2}{h}$

$\lim_{h\to 0} \frac{\cancel{x^2}+2hx+h^2-\cancel{x^2}}{h}$

$\lim_{h\to 0} \frac{2xh+h^2}{h}$

$\lim_{h\to 0} \frac{\cancel{h}(2x+h)}{\cancel{h}}$

$\lim_{h\to 0} 2x+h$

$2x+0 = \boxed{2x}$

(42) $\lim_{h\to 0} \frac{(x+h)^3-x^3}{h}$

$\lim_{h\to 0} \frac{\cancel{x^3}+3x^2h+3xh^2+h^3-\cancel{x^3}}{h}$

$\lim_{h\to 0} \frac{\cancel{h}(3x^2+3xh+h^2)}{\cancel{h}}$

$\lim_{h\to 0} 3x^2+3xh+h^2$

$3x^2+3x(0)+0$

$\boxed{3x^2}$

(43) $\lim_{x\to\infty} \frac{3x}{7x-1}$

$\lim_{x\to\infty} \frac{3x}{7x-1}$ Divide ~~Multiply~~ by x.

$\lim_{x\to\infty} \frac{\frac{3\cancel{x}}{\cancel{x}}}{\frac{7\cancel{x}}{\cancel{x}}-\frac{1}{x}}$

$\lim_{x\to\infty} \frac{3}{7-\frac{1}{x}}$

Using limits at infinity:

$\therefore \frac{1}{x^n} = 0$

$\lim_{x\to\infty} \frac{3}{7-0}$

$\boxed{\frac{3}{7}}$

(44) $\lim_{x\to\infty} \frac{8x+2}{4x-5}$

$\lim_{x\to\infty} \frac{\frac{8\cancel{x}}{\cancel{x}}+\frac{2}{x}}{\frac{4\cancel{x}}{\cancel{x}}-\frac{5}{x}}$

$\lim_{x\to\infty} \frac{8+2(\frac{1}{x})}{4-5(\frac{1}{x})}$

$\therefore \frac{1}{x^n} = 0$

$\frac{8+2(0)}{4-5(0)}$

$8/4 = \boxed{2}$

(45) $\lim_{x\to\infty} \frac{3x^2+2x}{2x^2-2x+1}$

$\lim_{x\to\infty} \frac{\frac{3\cancel{x^2}}{\cancel{x^2}}+\frac{2x}{x^2}}{\frac{2\cancel{x^2}}{\cancel{x^2}}-\frac{2x}{x^2}+\frac{1}{x^2}}$

$\lim_{x\to\infty} \frac{3+2(\frac{1}{x})}{2-2(\frac{1}{x})+\frac{1}{x^2}}$

$\therefore \frac{1}{x^n} = 0$

$\frac{3+2(0)}{2-2(0)+0}$

$\boxed{\frac{3}{2}}$

(46) $\lim_{x\to\infty} \frac{x^2+2x-5}{3x^2+2}$

$\lim_{x\to\infty} \frac{\frac{\cancel{x^2}}{\cancel{x^2}}+\frac{2x}{x^2}-\frac{5}{x^2}}{\frac{3\cancel{x^2}}{\cancel{x^2}}+\frac{2}{x^2}}$

$\lim_{x\to\infty} \frac{1+2(\frac{1}{x})-5(\frac{1}{x^2})}{3+2(\frac{1}{x})}$

$\frac{1+2(0)-5(0)}{3+2(0)} = \boxed{1/3}$

Date:

(47) $\lim_{x\to\infty} \frac{3x^2+2x-1}{2x^4-3x^3-2}$

$\lim_{x\to\infty} \frac{3x^2+2x-1}{2x^4-3x^3-2}$

$\lim_{x\to\infty} \frac{\frac{3x^2}{x^4}+\frac{2x}{x^4}-\frac{1}{x^4}}{\frac{2x^4}{x^4}-\frac{3x^3}{x^4}-\frac{2}{x^4}}$

$\lim_{x\to\infty} \frac{3\left(\frac{1}{x^2}\right)+2\left(\frac{1}{x^3}\right)-\frac{1}{x^4}}{2-3\left(\frac{1}{x}\right)-2\left(\frac{1}{x^4}\right)}$

$\frac{3(0)+2(0)-(0)}{2-3(0)-2(0)}$

$\frac{0}{2} = \boxed{0}$

(48) $\lim_{x\to\infty} \frac{2x^2-1}{3x^4+2}$

$\lim_{x\to\infty} \frac{\frac{2x^2}{x^4}-\frac{1}{x^4}}{\frac{3x^4}{x^4}+\frac{2}{x^4}}$

$\lim_{x\to\infty} \frac{2\left(\frac{1}{x^2}\right)-\frac{1}{x^4}}{3+2\left(\frac{1}{x^4}\right)}$

$\lim_{x\to\infty} \frac{2(0)-(0)}{3+2(0)}$

$\frac{0}{3} = \boxed{0}$

(49) $\lim_{x\to\infty} \frac{2x^3-x-3}{6x^2-x-1}$

$\lim_{x\to\infty} \frac{\frac{2x^3}{x^3}-\frac{x}{x^3}-\frac{3}{x^3}}{\frac{6x^2}{x^3}-\frac{x}{x^3}-\frac{1}{x^3}}$

$\lim_{x\to\infty} \frac{2-\frac{1}{x^2}-3\left(\frac{1}{x^3}\right)}{6\left(\frac{1}{x}\right)-\frac{1}{x^2}-\frac{1}{x^3}}$

$\frac{2-0-3(0)}{6(0)-0-0} = \frac{2}{0} = \boxed{\infty}$

(50) $\lim_{x\to\infty} \frac{x^4-x^3-3x}{3x^2+2}$

$\lim_{x\to\infty} \frac{\frac{x^4}{x^4}-\frac{x^3}{x^4}-\frac{3x}{x^4}}{\frac{3x^2}{x^4}+\frac{2}{x^4}}$

$\lim_{x\to\infty} \frac{1-\frac{1}{x}-3\left(\frac{1}{x^3}\right)}{3\left(\frac{1}{x^2}\right)+2\left(\frac{1}{x^4}\right)}$

$\frac{1-0-3(0)}{3(0)+2(0)}$

$= \frac{1}{0} = \boxed{\infty}$

(51) $\lim_{x\to\infty} \frac{2x^2-7x^4}{9x^2+5x-6}$

$\lim_{x\to\infty} \frac{\frac{2x^2}{x^4}-\frac{7x^4}{x^4}}{\frac{9x^2}{x^4}+\frac{5x}{x^4}-\frac{6}{x^4}}$

$\lim_{x\to\infty} \frac{2\left(\frac{1}{x^2}\right)-7}{9\left(\frac{1}{x^2}\right)+5\left(\frac{1}{x^3}\right)-\frac{6}{x^4}}$

$\frac{2(0)-7}{9(0)+5(0)-0}$

$\boxed{-\infty}$

(52) $\lim_{x\to\infty} \frac{-5x^3-4x^2+8}{6x^2+3x+2}$

$\lim_{x\to\infty} \frac{-\frac{5x^3}{x^3}-\frac{4x^2}{x^3}+\frac{8}{x^3}}{\frac{6x^2}{x^3}+\frac{3x}{x^3}+\frac{2}{x^3}}$

$\lim_{x\to\infty} \frac{-5-4\left(\frac{1}{x}\right)+8\left(\frac{1}{x^3}\right)}{6\left(\frac{1}{x}\right)+3\left(\frac{1}{x^2}\right)+2\left(\frac{1}{x^3}\right)}$

$\frac{-5-4(0)+8(0)}{6(0)+3(0)+2(0)}$

$-5/0 = \boxed{\infty}$

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CH # 2

(Ex. 2.2)

formula used:

$y = a(x-h)^2 + k.$

Date:

Q 3 to 8 from book.

Q9 $y = 3x^2 + 9x + 5$

$y = 3(x^2 + 3x) + 5$

Completing square.

$y = 3\left(x^2 + 3x + \left(\frac{3}{2}\right)^2\right) + 5 - \left(\frac{3}{2}\right)^2 3$

$y = 3\left(x + \frac{3}{2}\right)^2 + 5 - \left(\frac{9}{4}\right)3$

$y = 3\left(x + \frac{3}{2}\right)^2 + \frac{20-27}{4}$

$y = 3\left(x + \frac{3}{2}\right)^2 - \frac{7}{4}$

$x + \frac{3}{2} = 0$ | $\boxed{y = -7/4}$

$\boxed{x = -3/2}$

(10) $y = 4x^2 - 20x - 7$

$y = 4(x^2 - 5x) - 7$

$y = 4\left(x^2 - 5x + \left(\frac{5}{4}\right)^2\right) - 7 - \left(\frac{5}{4}\right)^2 4$

$y = 4\left(x - \frac{5}{4}\right)^2 - 7 - \frac{100}{4}$

$y = 4\left(x - \frac{5}{4}\right)^2 - \frac{28-100}{4}$

$y = 4\left(x - \frac{5}{4}\right)^2 - \frac{128}{4}$

$y = 4\left(x - \frac{5}{4}\right)^2 - 32$

$x - 5/4 = 0$ | $\boxed{y = -32}$

$\boxed{x = 5/4}$

(11) $y = -2x^2 + 8x - 9$

$y = -2(x^2 - 4x) - 9$

$y = -2(x^2 - 4x + (2)^2) - 9 + 2(2)^2$

$y = -2(x^2 - 4x + (2)^2) - 9 + 8$

$y = -2(x-2)^2 - 1$

$x - 2 = 0$ | $\boxed{y = -1}$

$\boxed{x = 2}$

(12) $y = -5x^2 - 8x + 3$

$y = -5\left(x^2 - \frac{8x}{5} + \left(\frac{4}{5}\right)^2\right) + 3 - \left(\frac{4}{5}\right)^2 5$

$y = -5\left(x + \frac{4}{5}\right)^2 + 3 + \frac{80}{25}$

$y = -5\left(x + \frac{4}{5}\right)^2 + \frac{75+80}{25}$

$y = -5\left(x + \frac{4}{5}\right)^2 + \frac{155}{25}$

$y = -5\left(x + \frac{4}{5}\right)^2 + \frac{31}{5}$

$x + \frac{4}{5} = 0$ | $\boxed{y = \frac{31}{5}}$

$\boxed{x = -4/5}$

(13) $y = x^2 + 5x + 6$

$x = \frac{-b}{2a} = \boxed{\frac{-5}{2}}$

$y = \frac{25}{4} + \left(\frac{-25}{2}\right) + 6 \Rightarrow \frac{25-50}{4} + 6$

$y = \frac{-25}{4} + 6 \Rightarrow \frac{-25+24}{4} \Rightarrow \boxed{-1/4}$

if $x = 0$, then $y =$

$y = 0 + 5(0) + 6$

$\boxed{y = 6}$

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Using formula:

$x = \frac{-b}{2a}$.

Date:

$\boxed{y=0}$

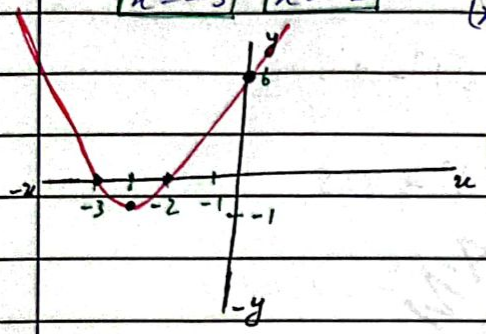
$y = x^2+5x+6$

$0 = x^2+5x+6$

$x^2+3x+2x+6=0$

$(x+3)(x+2)=0$

$\boxed{x=-3}$ $\boxed{x=-2}$



(14) $y = x^2+4x-5$

$x = \frac{-b}{2a} = \frac{-4}{2} = \boxed{-2}$

$y = 4+4(-2)-5$

$y = 4-8-5$

$\boxed{y=-9}$

$(x=0)$

$y = 0+0-5$

$\boxed{y=-5}$

$(y=0)$

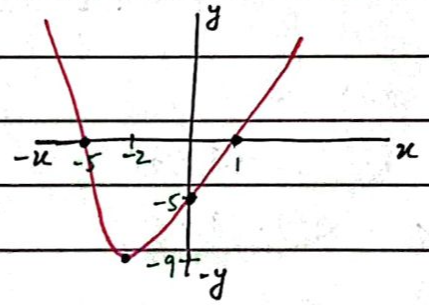
$0 = x^2+4x-5$

$x^2+5x-x-5=0$

$x(x+5)-1(x+5)=0$

$(x-1)(x+5)=0$

$\boxed{x=1}$ | $\boxed{x=-5}$



(15) $y = -2x^2-12x-16$

$x = \frac{-b}{2a} = \frac{12}{-4} = \boxed{-3}$

$y = -2(-3)^2-12(-3)-16$

$y = \cancel{-32+48-16}$

$y = -18+36-16$

$\boxed{y=2}$

$(x=0)$

$y = -2(0)-12(0)-16$

$\boxed{y=-16}$

$(y=0)$

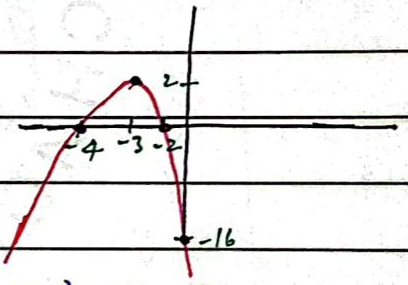
$0 = -2(x)^2-12x-16$

$x^2+6x+8=0$

$x^2+4x+2x+8=0$

$x(x+4)+2(x+4)=0$

$\boxed{x=-4}$ | $\boxed{x=-2}$



(16) $y = -3x^2-6x+4$

$x = \frac{-b}{2a} = \frac{6}{2(-3)} = \boxed{-1}$

$y = -3(1)+6+4$

$y = -3+10$

$\boxed{y=7}$

$(x=0)$ $y = 0+0+4$

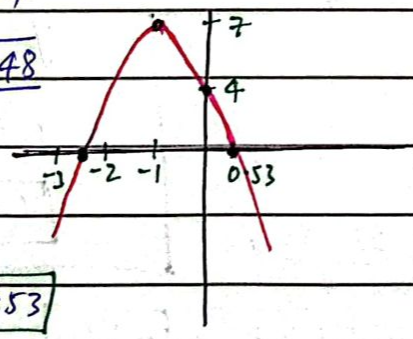
$\boxed{y=4}$

$(y=0)$ $0 = -3x^2-6x+4$

$x = \frac{+6 \pm \sqrt{36+48}}{-6}$

$x = -1 \pm \frac{\sqrt{21}}{3}$

$\boxed{x=0.53}$, $\boxed{x=-2.53}$



(17) $f(x) = 2x^2+8x-8$

$y = 2x^2+8x-8$

$x = \frac{-b}{2a} = \frac{-8}{4} = \boxed{-2}$

$y = 2(4)+8(-2)-8$

$y = \cancel{8}-16-\cancel{8}$

$\boxed{y=-16}$

$(x=0)$

$y = 0+0-8 = \boxed{-8}$

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$(y=0)$

$0 = 2x^2 + 8x - 8$

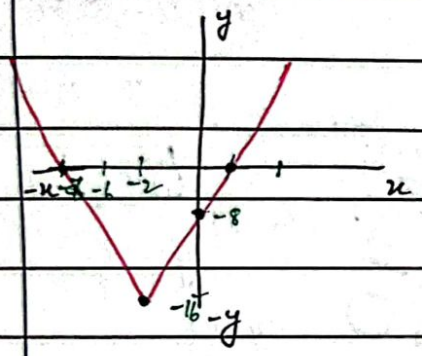
$x^2 + 4x - 4 = 0$

$\cancel{x^2 + 2x + 2x - 4 = 0}$

$x = \dfrac{-4 \pm \sqrt{16+16}}{2}$

$x = -2 \pm \sqrt{32}$

$\boxed{x = 3.65}$, $\boxed{x = -7.65}$



(18) $f(x) = -x^2 + 6x - 6$

$y = -x^2 + 6x - 6$

$x = \dfrac{-b}{2a} = \dfrac{-6}{2(-1)} = \boxed{3}$

$y = -9 + 18 - 6$

$\boxed{y = 3}$

$(x=0)$

$y = 0 + 0 - 6$

$\boxed{y = -6}$

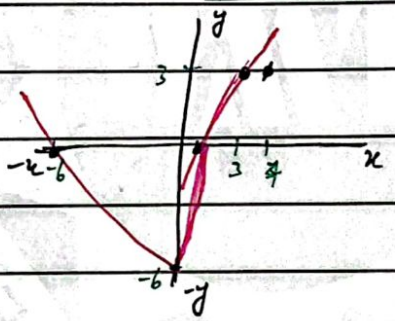
$(y=0)$

$0 = -x^2 + 6x - 6$

$x = \dfrac{\cancel{-6}^{3} \pm \sqrt{36-24}}{\cancel{-2}}$

$x = +3 \pm \sqrt{12}$

$\boxed{x = -0.46}$ $\boxed{x = +6.46}$



(19) $f(x) = 2x^2 - 4x + 5$

$y = 2x^2 - 4x + 5$

$x = \dfrac{-b}{2a} = \dfrac{4}{4} = \boxed{1}$

$y = 2 - 4 + 5$

$\boxed{y = 3}$

$(x=0)$

$y = 0 + 0 + 5$

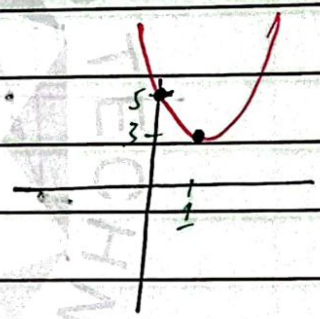
$\boxed{y = 5}$

$(y=0)$

$0 = 2x^2 - 4x + 5$

$x = \dfrac{4 \pm \sqrt{16-40}}{4}$

$\boxed{x = 1 \pm \sqrt{-24}}$



(20) $f(x) = \frac{1}{2}x^2 + 6x + 24$

$y = \frac{1}{2}x^2 + 6x + 24$

$x = \dfrac{-b}{2a} = \boxed{-6}$

$y = \frac{1}{2}(36) + 6(-6) + 24$

$y = 18 - 36 + 24$

$\boxed{y = 6}$

$(x=0)$

$y = 0 + 0 + 24$

$\boxed{y = 24}$

$(y=0)$

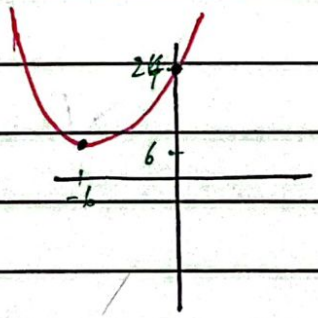
$0 = \frac{1}{2}x^2 + 6x + 24$

$0 = \cancel{2} \times \frac{1}{\cancel{2}}x^2 + 6 \times 2x + 24 \times 2$

$x^2 + 12x + 48 = 0$

$x = \dfrac{-12 \pm \sqrt{144 - 4(48)}}{2}$

$\boxed{x = -6 \pm \sqrt{-48}}$



(21) $f(x) = -2x^2 + 16x - 21$

$y = -2x^2 + 16x - 21$

$x = \dfrac{-b}{2a} = \dfrac{-16}{4} = \boxed{+4}$

$y = -2(16) + 16(+4) - 21$

$y = -32 + 64 - 21$

$\boxed{y = 11}$

$(x=0)$

$y = 0 + 0 - 21$

$\boxed{y = -21}$

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Date:

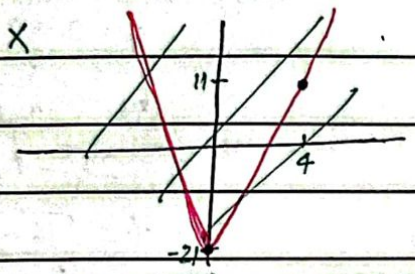
$(y=0)$

$0 = -2x^2 + 16x - 21$

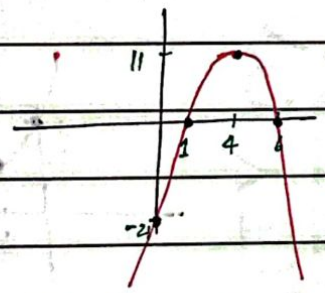
$-2x^2 + 16x - 21 = 0$

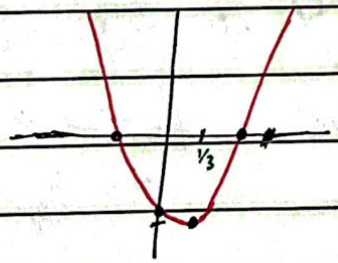
$x = \dfrac{-16 \pm \sqrt{256 - 168}}{-4}$

$\boxed{x = 4 \pm \sqrt{88}} \approx 4 \pm \dfrac{\sqrt{22}}{2}$



$\boxed{x = 6.35}$ $\boxed{x = 1.65}$





(22) $f(x) = \dfrac{3}{2}x^2 - x - 4$

$y = \dfrac{3}{2}x^2 - x - 4$

$x = \dfrac{-b}{2a} = \boxed{\dfrac{+1}{3}}$

$y = \dfrac{3}{2}\left(\dfrac{1}{9}\right) - \left(\dfrac{1}{3}\right) - 4$

$y = \dfrac{3}{18} - \dfrac{1}{3} - 4$

$y = \dfrac{3 - 6}{18} - 4$

$y = \dfrac{-3}{18} - 4$

$y = \dfrac{-1 - 24}{6} = \boxed{\dfrac{-25}{6}}$

$(x=0)$

$y = 0 - 0 - 4$

$\boxed{y = -4}$

$(y=0)$

$0 = \dfrac{3}{2}x^2 - x - 4$

$(\times 2) \rightarrow$ $3x^2 - 2x - 8 = 0$

$x = \dfrac{2 \pm \sqrt{4 + 96}}{6}$

$x = \dfrac{2 \pm \sqrt{100}}{6}$

$x = \dfrac{2 + 10}{6}$ | $x = \dfrac{2 - 10}{6}$

$x = \dfrac{12}{6}$ $x = \dfrac{-8}{6}$

$\boxed{x = 2}$ $\boxed{x = -\dfrac{4}{3}}$

(23) $f(x) = \dfrac{1}{3}x^2 - \dfrac{8}{3}x + \dfrac{1}{3}$

$y = \dfrac{1}{3}x^2 - \dfrac{8}{3}x + \dfrac{1}{3}$

$x = \dfrac{-b}{2a} = \dfrac{8/4}{3(2)\left(\frac{1}{3}\right)}$

$\boxed{x = 4}$

$y = \dfrac{1}{3}(16) - \dfrac{8}{3}(4) + \dfrac{1}{3}$

$(\times 3) \rightarrow$

$y = 16 - 8(4) + 1$

$y = 16 - 32 + 1$

$\boxed{y = -15}$

$(x=0)$

$y = \dfrac{1}{3}$

$(y=0)$

$0 = \dfrac{1}{3}x^2 - \dfrac{8}{3}x + \dfrac{1}{3}$

$0 = x^2 - 8x + 1$

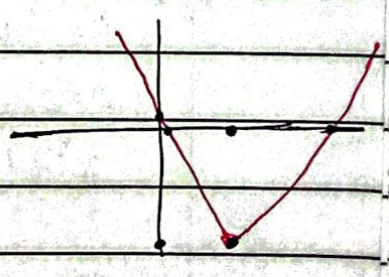
$x = \dfrac{8 \pm \sqrt{64 - 4}}{2}$

$x = \dfrac{8 \pm \sqrt{60}}{2}$

$x = 4 \pm \sqrt{15}$

$x = 4 \pm \sqrt{15}$

$\boxed{x = 7.87}$, $\boxed{x = 0.13}$



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CH # 2

Date:

(Ex. 2.4)

(24) $f(x) = -\frac{1}{2}x^2 - x - \frac{7}{2}$

$x = \frac{-b}{2a} \Rightarrow \frac{+1}{-1} = \boxed{-1}$

$y = -\frac{1}{2} + x - \frac{7}{2}$

$y = \frac{-1-7}{2} + 1$

$y = \frac{-8}{2} + 1$

$y = -4 + 1 = \boxed{-3}$

$(x=0)$

$y = 0 - 0 - \frac{7}{2}$

$\boxed{y = -7/2}$

$(y=0)$

$0 = -\frac{1}{2}x^2 - x - \frac{7}{2}$

$(\times 2) \rightarrow$

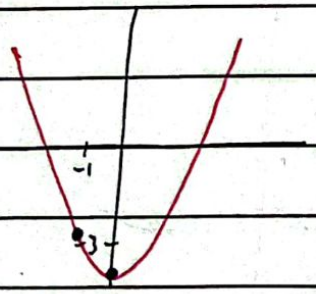
$0 = -x^2 - 2x - 7$

$x = \frac{2 \pm \sqrt{4-28}}{-2}$

$x = \frac{2 \pm \sqrt{24}}{-2}$

$x = \frac{\cancel{2}(1 \pm \sqrt{6})}{-\cancel{2}}$

$\boxed{x = -1 \pm \sqrt{6}}$



(13) $2^x = 32$

$2^x = 2^5$

$\boxed{x=5}$

(14) $4^x = 64$

$4^x = 4^3$

$\boxed{x=3}$

(15) $3^x = \frac{1}{81}$

$3^x = 3^{-4}$

$\boxed{x=-4}$

(16) $e^x = \frac{1}{e^5}$

$e^x = e^{-5}$

$\boxed{x=-5}$

(17) $4^x = 8^{x+1}$

$2^{2x} = 2^{3x+3}$

$2x = 3x+3$

$3x - 2x = -3$

$\boxed{x=-3}$

(18) $25^x = 125^{x+2}$

$5^{2x} = 5^{3(x+2)}$

$2x = 3x+6$

$3x - 2x = -6$

$\boxed{x=-6}$

(19) $16^{x+3} = 64^{2x-5}$

$4^{2(x+3)} = 4^{3(2x-5)}$

$2x+6 = 6x-15$

$4x = 21$

$\boxed{x = 21/4}$

(20) $(e^3)^{-2x} = e^{-x+5}$

$-6x = -x+5$

$6x - x = -5$

$5x = -5$

$\boxed{x=-1}$

(21) $e^{-x} = (e^4)^{x+3}$

$-x = 4x+12$

$4x + x = -12$

$5x = -12$

$\boxed{x = \frac{-12}{5}}$

(22) $2^{|x|} = 8$

$2^{|x|} = 2^3$

$\boxed{x = \pm 3}$

(23) $5^{-|x|} = \frac{1}{25}$

$5^{-|x|} = 5^{-2}$

$\boxed{x = \pm 2}$

(24) $2^{x^2-4x} = \left(\frac{1}{16}\right)^{x-4}$

$2^{x^2-4x} = (2^{-4})^{x-4}$

$x^2 - \cancel{4x} = -\cancel{4x} + 16$

$x^2 - 16 = 0$

$(x+4)(x-4) = 0$

$\boxed{x = \pm 4}$

(25) $5^{x^2+x} = 1$

$5^{x^2+x} = 5^0$

$x^2 + x = 0$

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CH # 1

(Ex. 1.2)

Date:

$x(x+1)=0$

$\boxed{x=0}$ | $\boxed{x=-1}$

(26) $8^{x^2} = 2^{x+4}$

$(2^3)^{x^2} = 2^{x+4}$

$3x^2 = x+4$

$3x^2 - x - 4 = 0$

$3x^2 - 4x + 3x - 4 = 0$

$x(3x-4) + 1(3x-4) = 0$

$3x-4=0$ | $x+1=0$

$\boxed{x = 4/3}$ $\boxed{x=-1}$

(27) $27^x = 9^{x^2+x}$

$3^{3x} = 3^{2(x^2+x)}$

$3x = 2x^2+2x$

$2x^2+2x-3x=0$

$2x^2 - x = 0$

$x(2x-1)=0$

$\boxed{x=0}$ | $\boxed{x=1/2}$

(28) $e^{x^2+5x+6} = 1$

$e^{x^2+5x+6} = e^0$

$x^2+5x+6=0$

$x^2+3x+2x+6=0$

$(x+3)(x+2)=0$

$\boxed{x=-3}$ | $\boxed{x=-2}$

(1) $f(2) = 7-5x$

$f(2) = 7-5(2)$

$f(2) = 7-10$

$f(2) = \boxed{-3}$

(2) $f(4) = 7-5x$

$= 7-5(4)$

$= 7-20$

$= \boxed{-13}$

(3) ~~$f(-3) = 7-5x$~~

$= 7-5(-3)$

$= 7+15$

$= \boxed{22}$

(4) $f(-1) = 7-5x$

$= 7-5(-1)$

$= 7+5$

$= \boxed{12}$

(5) $g(1.5) = 2x-3$

$g(1.5) = 2(\frac{3}{2})-3$

$\boxed{0}$

(6) $g(2.5) = 2x-3$

$= 2(\frac{5}{2})-3$

$= 5-3 = \boxed{2}$

(7) $g(-1/2) = 2x-3$

$= 2(-\frac{1}{2})-3$

$= -1-3 = \boxed{-4}$

(8) $g(-3/4) = 2x-3$

$= 2(-\frac{3}{4})-3$

$= \frac{-3-6}{2} = \boxed{-9/2}$

(9) $f(t) = \cancel{2x-3}\ 7-5x$

$= \cancel{2t-3}\ \boxed{7-5t}$

(10) $g(x^2) = 2x-3$

$= \boxed{2x^2-3}$

(19) Statement from book.

Sol: $C(h) = (\text{marginal cost}) \times (\text{No. of hrs}) + \text{fixed cost}$

$C(h) = 2.25 \times h + 10$

$\boxed{C(h) = 2.25h + 10}$

(20) Sol:

$C(x) = (\text{marginal cost}) \times (\text{No. of sng}) + \text{fixed cost}$

$C(x) = (0.99)x + 10$

$\boxed{C(x) = 10 + 0.99x}$

(21) Sol:

$C(x) = (\text{m. cost}) \times (\text{No. of half hrs}) + \text{fixed cost}$

$C(x) = (0.75)x + 2$

$\boxed{C(x) = 2 + 0.75x}$

(22) Sol. x = miles.

$\boxed{C(x) = 44 + 0.28x}$

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CH # 1

Formula used:

$y = mx + b$

$m = \frac{y_2 - y_1}{x_2 - x_1}$ / $y - y_1 = m(x - x_1)$ Date:

(Ex. 1.1)

① Through (4, 5) and (-1, 2)

$(x_1, y_1) = (4, 5)$

$(x_2, y_2) = (-1, 2)$

Using formula:

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$m = \frac{+2 - 5}{-1 - 4}$

$m = \frac{+3}{-5} = \boxed{\frac{3}{5}}$

② Through (5, -4) & (1, 3)

$(x_1, y_1) = (5, -4)$

$(x_2, y_2) = (1, 3)$

Using formula:

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$m = \frac{3 - (-4)}{1 - 5}$

$m = \boxed{-\frac{7}{4}}$

③ Through (8, 4) & (-2, 5)

$(x_1, y_1) = (8, 4)$

$(x_2, y_2) = (-2, 5)$

Using formula:

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$m = \frac{5 - 4}{-2 - 8}$

$m = \boxed{-\frac{1}{10}}$

④ Through (1, 5) & (-2, 5)

$(x_1, y_1) = (1, 5)$

$(x_2, y_2) = (-2, 5)$

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$m = \frac{5 - 5}{-2 - 1}$

$\boxed{m = 0}$

⑤ $y = x$

Comparing with

$y = mx + b$

$y = x + 0$

So,

$\boxed{m = 1}$

$\boxed{b = 0}$

⑥ $y = 3x - 2$

Comparing with

$y = mx + b$

$y = 3x - 2$

$\boxed{m = 3}$

$\boxed{b = -2}$

⑦ $5x - 9y = 11$

$9y = 5x - 11$

$y = \frac{5x}{9} - \frac{11}{9}$

So,

compare:

$y = mx + b$

$\boxed{m = 5/9}$

$\boxed{b = -11/9}$

⑧ $4x + 7y = 1$

$7y = 1 - 4x$

$7y = -4x + 1$

$y = \left(\frac{-4}{7}\right)x + \left(\frac{1}{7}\right)$

$y = mx + b$

$\boxed{m = -4/7}$

$\boxed{b = 1/7}$

⑨ $x = 5$

~~Subtracting~~ Subtract 5 on b.s.

$x - 5 = 5 - 5$

$x - 5 = 0$

add y on '0' side.

$0y = x - 5$

$y = \left(\frac{1}{0}\right)x - \frac{5}{0}$

$\boxed{m = \infty}$

⑩ The x-axis

So, every y-coordinates on x-axis is zero.

$y = 0$

So, multiply 0 with x.

$y = 0x$

Add zero.

$y = 0x + 0$.

$y = mx + b$.

$\boxed{m = 0}$

⑪ $y = 8$

So, add zero to right

$y = 0 + 8$

multiply x with 0.

$y = 0x + 8$

$y = mx + b$

$\boxed{m = 0}$

⑫ $y = -6$

Add zero.

$y = 0 - 6$

Multiply x.

$y = 0x - 6$

$y = mx - 6$

$\boxed{m = 0}$

⑬ Parallel line $6x - 3y = 12$

$3y = 6x - 12$

$y = \frac{6x}{3} - \frac{12}{3}$

$y = 2x - 4$

$y = mx + b$

$\boxed{m = 2}$

∴ As parallel lines have same slope.

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formula used: (15 onward)

$y - y_1 = m(x - x_1)$.

Date:

(14) A line perpendicular $8x = 2y - 5$

if lines are perpendicular then

$y = m_1 x + b_1$ — i)

$y = m_2 x + b_2$ — ii)

So, equation i) & ii) are also perpendicular in relation.

$m_1 m_2 = -1$ — iii)

So, Simplify:

$8x = 2y - 5$

$2y = 8x - 5$

$y = 4x - 5/2$

$\boxed{m_1 = 4}$

$b_1 = -5/2$

Putting value in eq — iii)

$m_1 m_2 = -1$

$m_2 = \frac{-1}{m_1}$

$\boxed{m_2 = -1/4}$

(15) Through $(1, 3)$, $m = -2$

$(x_1, y_1) = (1, 3)$ $\therefore (m = -2)$

Using formula:

$y = mx + b$

$y = -2x + b$

$3 = -2(1) + b$

$b = 3 + 2$

$\boxed{b = 5}$

So, equation is:

$\boxed{y = -2x + 5}$

(16) Through $(2, 4)$, $m = -1$

$(x_1, y_1) = (2, 4)$, $m = -1$.

Using formula:

$y - y_1 = m(x - x_1)$

$y - 4 = -1(x - 2)$

$y - 4 = -x + 2$

$\boxed{y = -x + 6}$

(17) Through $(-5, -7)$, $m = 0$.

$(x_1, y_1) = (-5, -7)$, $m = 0$.

Using Formula:

$y - y_1 = m(x - x_1)$

$y + 7 = 0(x + 5)$

$y + 7 = 0x + 0$

$\boxed{y = 0x \cancel{+13}}$ $\boxed{y = 0x - 7}$

(18) Through $(-8, 1)$, with undefined slope.

So, for undefined slope = $m = \frac{1}{0}$ OR ∞

$(x_1, y_1) = -8, 1)$

Using formula:

$y - 1 = \frac{1}{0}(x + 8)$

$y - 1 = \frac{1}{0}x + \frac{8}{0}) \Rightarrow \boxed{\cancel{y = 0x - 1}}$

$\cancel{y = \infty}$ $0(y - 1) = 1(x + 8)$

$0 = x + 8$

$\boxed{x = -8}$.

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(19) Through $(4, 2)$ and $(1, 3)$

$(x_1, y_1) = (4, 2)$

$(x_2, y_2) = (1, 3)$

Using formula:

$y_1 = mx_1 + b$ — i)

$2 = m(4) + b$

$4m + b = 2$ — a)

$y_2 = mx_2 + b$

$3 = m(1) + b$

$m + b = 3$ — b)

Subtrating a for b:

$4m + \cancel{b} - m - \cancel{b} = 2 - 3$

$3m = -1$

$\boxed{m = -1/3}$

Now put value in eq-b).

$-\frac{1}{3} + b = 3$

$b = \frac{1}{3} + 3$

$b = \frac{1+9}{3}$

$\boxed{b = \frac{10}{3}}$

Now,

$y = mx + b$

$\boxed{y = -\frac{1}{3}x + \frac{10}{3}}$

(20) Through $(8, -1)$ & $(4, 3)$

$(x_1, y_1) = (8, -1)$

$(x_2, y_2) = (4, 3)$

Using formula:

$y_1 = mx_1 + b$ — i)

$-1 = m(8) + b$

$8m + b = -1$ — a)

$y_2 = mx_2 + b$

$3 = m(4) + b$

$4m + b = 3$ — b)

Subtracting b from a:

$8m + \cancel{b} - 4m - \cancel{b} = -1 - 3$

$4m = -4$

$\boxed{m = -1}$

Put value in eq-b)

$4(-1) + b = 3$

$-4 + b = 3$

$b = 3 + 4$

$\boxed{b = 7}$

Now,

$y = mx + b$

$\boxed{y = -x + 7}$

(21) Thro

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(21) Through $(\frac{2}{3}, \frac{1}{2})$ & $(\frac{1}{4}, -2)$

$(x_1, y_1) = (\frac{2}{3}, \frac{1}{2})$

$(x_2, y_2) = (\frac{1}{4}, -2)$

Using formula ⇒

$y_1 = mx_1 + b$

$\frac{1}{2} = m(\frac{2}{3}) + b$

$\frac{1}{2} = \frac{2}{3}m + b$

(×6) $3 = 4m + 6b$ — a)

$y_2 = mx_2 + b$

$-2 = \frac{1}{4}m + b$

(×4) $-8 = m + 4b$ — c)

(×4) $4m + 16b = -32$ — b)

Subtract b) from a

$4m + 16b - 4m - 6b = 32 + 3$

$10b = 35$

$-10b = 35$

$b = -\frac{35}{10}$

$\boxed{b = -7/2}$

Putting value in eq-c)

$m + 4b = -8$

$m + 4(-\frac{7}{2}) = -8$

$m - 14 = -8$

$m = -8 + 14$

$\boxed{m = 6}$

So,

$\boxed{y = 6x - \frac{7}{2}}$

(22) Through $(-2, 3/4)$ & $(2/3, 5/2)$

$(x_1, y_1) = (-2, 3/4)$

$(x_2, y_2) = (2/3, 5/2)$

Using formula ⇒

$y_1 = mx_1 + b$

$\frac{3}{4} = -2m + b$

(×4) $3 = -8m + b$

$8m - b = -3$ — a)

$y_2 = mx_2 + b$

$\frac{5}{2} = \frac{2}{3}m + b$

(×6).

$15 = 4m + b$

$-4m - b = -15$

Subtracting a) from b)

$8m - b + 4m + b = +15 - 3$

$12m = 12$

$\boxed{m = 1}$

Putting value in eq-b)

$15 = 4m + b$

$15 - 4 = b$

$\boxed{b = 11}$

So,

$y = mx + b$

$\boxed{y = x + 11}$.

(23) Through $(-8, 4)$ & $(-8, 6)$

$(x_1, y_1) = (-8, 4)$

$(x_2, y_2) = (-8, 6)$

Using Formula ⇒

$y_1 = mx_1 + b$

$4 = -8m + b$

$8m - b = -4$

$y_2 = mx_2 + b$

$6 = -8m + b$

$8m - b = -6$

Subtracting:

$8m - b - 8m + b = -4 + 6$

$0 = -4 + 6$

$\boxed{0 = 2}$

Hence, $0 \neq 2$.

So, Not defined.

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Formula used (25 onward)

$$y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$$

Date:

(24) Through $(-1,3)$ & $(0,3)$

$(x_1, y_1) = (-1,3)$

$(x_2, y_2) = (0,3)$

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$m = \frac{3-3}{0+1}$

$\boxed{m = 0}$

So, $y = mx + b$

$y = 0x + b$

so, putting value of m in eq.

$y = mx + b$

$3 = 0(-1) + b$

$\boxed{b = 3}$

So, $\boxed{y = 0x + 3}$

(25) x-intercept -6, y-intercept -3.

using formula:

$y - y_1 = m(x - x_1)$ — i)

$m = \frac{y_2 - y_1}{x_2 - x_1}$ — ii)

Compare:

a) $y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$

x-intercept $\rightarrow (-6, 0)$

y-intercept $\rightarrow (0, -3)$

Putting value in eq-a)

$y - 0 = \frac{-3-0}{0+6}(x+6)$

$y = \frac{-3}{6}(x+6)$

$y = -\frac{1}{2}(x+6)$

$-2y = x + 6$

$2y = -x - 6$

Adding $+x$ on b.s.

$2y + x = -\cancel{x} - 6 + \cancel{x}$

$\boxed{x + 2y = -6}$

(26) x-intercept -2, y-intercept 4.

⇒ Same formula as in 25.

$(x_1, y_1) = (-2, 0)$

$(x_2, y_2) = (0, 4)$

$y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$

$y - 0 = \frac{4-0}{0+2}(x+2)$

$y = \frac{4}{2}(x+2)$

$y = 2(x+2)$

$y = 2x + 4$

$2x - y = -4$

$\boxed{-2x + y = 4}$.

(27) Vertical, Through $(-6,5)$

The slope of vertical line is undefined (∞)

So, $(x_1, y_1) = (-6, 5)$ $\therefore (m = \infty)$

$y - y_1 = m(x - x_1)$

$y - 5 = \frac{1}{0}(x+6)$

$0(y-5) = x + 6$

$0 = x + 6$

$\boxed{x = -6}$

$\boxed{x + 6 = 0}$

(28) Horizontal, Through $(8,7)$

$(\because m = 0)$

$y - y_1 = m(x - x_1)$

$y - 7 = 0(x - 8)$

$\boxed{y - 7 = 0}$

$\boxed{y = 7}$

(29) Through $(-4,6)$ parallel to $3x + 2y = 13$.

Simplify ⇒

$3x + 2y = 13$

$2y = -3x + 13$

$y = -\frac{3}{2}x + \frac{13}{2}$

$y = mx + b$

$\boxed{m = -\frac{3}{2}}$

$\boxed{b = 13/2}$

Using formula.

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$y - y_1 = m(x - x_1)$

As we know,

$(x_1, y_1) = (-4, 6)$

So,

$y - 6 = -\frac{3}{2}(x + 4)$

$2(y-6) \quad -3x - 12$

$2y - \cancel{12} = -3x - \cancel{12}$

$2y = -3x$

$2y + 3x = 0$

$\boxed{3x + 2y = 0}$

(30) Through $(2, -5)$, parallel to $2x - y = -4$.

Simplify:

$2x - y = -4$

$y = 2x + 4$

$m = 2$

So, $(x_1, y_1) = (2, -5)$

$y - y_1 = m(x - x_1)$

$y + 5 = 2(x - 2)$

$y + 5 = 2x - 4$

$2x - y = 5 + 4$

$\boxed{2x - y = 9}$

(31) Through $(3, -4)$, perpendicular to $x + y = 4$.

As we know: if lines are perpendicular.

$m_1 m_2 = -1$ (∴ Derived from two equations)

Simplify:

$x + y = 4$

$y = -x + 4$

$m_1 = -1$

putting value:

$m_2 = \frac{-1}{m_1}$

$m_2 = \frac{\cancel{-1}}{\cancel{-1}}$

$\boxed{m = 1}$

$(x_1, y_1) = (3, -4)$

So, $y - y_1 = m(x - x_1)$

$y + 4 = 1(x - 3)$

$x - y = 4 + 3$

$\boxed{x - y = 7}$

(32) Through $(-2, 6)$, perpendicular to $x + 5y = 7$.

As we know:

$m_1 m_2 = -1$.

So,

$x + 5y = 7$

$5y = -x + 7$

$y = -1/5\, x + 7/5$

$m_1 = -1/5$

So, $m_2 = \frac{+1}{+1/5}$

$m_2 = 5$

$(x_1, y_1) = (-2, 6)$

$y - y_1 = m(x - x_1)$

$y - 6 = 5(x + 2)$

$y - 6 = 5x + 10$

$\boxed{5x - y = -16}$

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(33) The line with y-intercept 4 & perpendicular to $x+5y=7$.

So,

$$x+5y=7$$
$$5y=-x+7$$
$$y=-1/5\,x+7/5$$

Slope $=-1/5$, y-intercept $=7/5$

So, as we know lines are perpendicular so, product of lines should be -1.

So,

$$m_p m_1=-1$$
$$m_p\times\left(-\frac{1}{5}\right)=-1$$
$$m=5$$

So, as y-intercept is 4 given.

$$y=mx+b$$
$$\boxed{y=5x+4}$$
$$\boxed{5x-y=-4}$$

(34) The line with x-intercept $-2/3$, & perpendicular to $2x-y=4$.

So,

$$2x-y=4$$
$$y=2x-4$$

Slope $=2$, So, as lines are perpendicular so, product of lines be -1.

So,

$$m_p m_1=-1$$
$$m_p(2)=-1$$
$$m_p=-1/2$$

So, as x-intercept is given

$$y=mx+b$$
$$\boxed{y=-1/2\,x-2/3}$$
$$\boxed{\frac{1}{2}x+y=-2/3}$$

(CH # R) (Ex R.7)

(27) $\frac{5}{\sqrt{7}}=\frac{5}{\sqrt{7}}\times\frac{\sqrt{7}}{\sqrt{7}}=\boxed{\frac{5\sqrt{7}}{7}}$

(28) $\frac{5}{\sqrt{10}}=\frac{5}{\sqrt{10}}\times\frac{\sqrt{10}}{\sqrt{10}}=\frac{5\sqrt{10}}{10}=\boxed{\frac{\sqrt{10}}{2}}$

(29) $\frac{-3}{\sqrt{12}}=\frac{-3}{\sqrt{12}}\times\frac{\sqrt{12}}{\sqrt{12}}=\frac{-3\sqrt{12}}{12}=-\frac{\sqrt{12}}{4}=-\frac{\sqrt{4\cdot3}}{4}=-\frac{2\sqrt{3}}{4}=\boxed{-\frac{\sqrt{3}}{2}}$

(30) $\frac{4}{\sqrt{8}}=\frac{4}{\sqrt{8}}\times\frac{\sqrt{8}}{\sqrt{8}}=\frac{4\sqrt{8}}{8}=\frac{\sqrt{8}}{2}=\frac{\sqrt{4\cdot2}}{2}=\frac{2\sqrt{2}}{2}=\boxed{\sqrt{2}}$

(31) $\frac{3}{1-\sqrt{2}}=\frac{3}{1-\sqrt{2}}\times\frac{1+\sqrt{2}}{1+\sqrt{2}}=\frac{3+3\sqrt{2}}{1-2}=\frac{3+3\sqrt{2}}{-1}=\boxed{-3-3\sqrt{2}}$

(32) $\frac{5}{2-\sqrt{6}}=\frac{5}{2-\sqrt{6}}\times\frac{2+\sqrt{6}}{2+\sqrt{6}}=\frac{10+5\sqrt{6}}{4-6}=\boxed{\frac{10+5\sqrt{6}}{-2}}$

(33) $\frac{6}{2+\sqrt{2}}\Rightarrow\frac{6}{2+\sqrt{2}}\times\frac{2-\sqrt{2}}{2-\sqrt{2}}$

$$=\frac{12-6\sqrt{2}}{4-2}$$
$$=\frac{12-6\sqrt{2}}{2}$$
$$=\frac{\cancel{2}(6-3\sqrt{2})}{\cancel{2}}=\boxed{6-3\sqrt{2}}$$

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(34) $\frac{\sqrt{5}}{\sqrt{5}+\sqrt{2}} = \frac{\sqrt{5}-\sqrt{2}}{\sqrt{5}-\sqrt{2}} \Rightarrow \frac{5-\sqrt{10}}{5-2} \Rightarrow \boxed{\frac{5-\sqrt{10}}{3}}$

(35) $\frac{1}{\sqrt{r}-\sqrt{3}} = \frac{1}{\sqrt{r}-\sqrt{3}} \times \frac{\sqrt{r}+\sqrt{3}}{\sqrt{r}+\sqrt{3}} \Rightarrow \boxed{\frac{\sqrt{r}+\sqrt{3}}{r-3}}$

(36) $\frac{5}{\sqrt{m}-\sqrt{5}} = \frac{5}{\sqrt{m}-\sqrt{5}} \times \frac{\sqrt{m}+\sqrt{5}}{\sqrt{m}+\sqrt{5}} \Rightarrow \boxed{\frac{5\sqrt{m}+5\sqrt{5}}{m-5}}$

(37) $\frac{y-5}{\sqrt{y}-\sqrt{5}} = \frac{y-5}{\sqrt{y}-\sqrt{5}} \times \frac{\sqrt{y}+\sqrt{5}}{\sqrt{y}+\sqrt{5}} = \frac{(y-5)(\sqrt{y}+\sqrt{5})}{(y-5)} = \boxed{\sqrt{y}+\sqrt{5}}$

(38) $\frac{\sqrt{z}-1}{\sqrt{z}-\sqrt{5}} = \frac{\sqrt{z}-1}{\sqrt{z}-\sqrt{5}} \times \frac{\sqrt{z}+\sqrt{5}}{\sqrt{z}+\sqrt{5}} = \frac{(\sqrt{z}-1)(\sqrt{z}+\sqrt{5})}{z-5} = \frac{z+5\sqrt{z}-\sqrt{z}-\sqrt{5}}{z-5} = \boxed{\frac{z+5\sqrt{z}-\sqrt{z}-\sqrt{5}}{z-5}}$

(39) $\frac{\sqrt{x}+\sqrt{x+1}}{\sqrt{x}-\sqrt{x+1}} \Rightarrow \frac{\sqrt{x}+\sqrt{x+1}}{\sqrt{x}-\sqrt{x+1}} \times \frac{\sqrt{x}+\sqrt{x+1}}{\sqrt{x}+\sqrt{x+1}} = \frac{x+2\sqrt{x(x+1)}+x+1}{x-(x+1)}$

$= \frac{2x+2\sqrt{x(x+1)}+1}{\cancel{x}-\cancel{x}-1} = \boxed{-2x-2\sqrt{x(x+1)}-1}$

(40) $\frac{\sqrt{p}+\sqrt{p^2-1}}{\sqrt{p}-\sqrt{p^2-1}} = \frac{\sqrt{p}+\sqrt{p^2-1}}{\sqrt{p}-\sqrt{p^2-1}} \times \frac{\sqrt{p}+\sqrt{p^2-1}}{\sqrt{p}+\sqrt{p^2-1}} \Rightarrow \frac{p+2\sqrt{p(p^2-1)}+p^2-1}{p-(p^2-1)}$

$= \frac{p^2+p+2\sqrt{p(p^2-1)}-1}{p-p^2+1} = \boxed{\frac{p^2+p+2\sqrt{p(p^2-1)}-1}{-p^2+p+1}}$

(Ex. R.6)

(9) $\frac{4^{-2}}{4} = \frac{1}{4^2 \cdot 4} = \frac{1}{4^{2+1}} = \frac{1}{4^3} = \boxed{\frac{1}{64}}$

(10) $\frac{8^9 \cdot 8^{-7}}{8^{-3}} = 8^{9-7+3} = \boxed{8^5}$

(11) $\frac{10^8 \cdot 10^{-10}}{10^4 \cdot 10^2} = \frac{10^{8-10}}{10^{4+2}} = \frac{10^{-2}}{10^6} = \frac{1}{10^{6+2}} = \boxed{\frac{1}{10^8}}$

(12) $\left(\frac{7^{-12} \cdot 7^3}{7^{-8}}\right)^{-1} = \left(\frac{7^{-12+3}}{7^{-8}}\right)^{-1}$

$= \left(\frac{7^{-9}}{7^{-8}}\right)^{-1} = 7^{-9+8} = (7^{-1})^{-1} = \boxed{7}$

(13) $\frac{x^4 \cdot x^3}{x^5} = x^{4+3-5} = x^2 = \boxed{x^2}$

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Date:

(14) $\frac{y^{10}\cdot y^{-4}}{y^{6}} = y^{10-4-6} = y^{0} = \boxed{1}$

(15) $\frac{(4k^{-1})^2}{2k^{-5}} = \frac{16k^{-2}}{2k^{-5}} = 8k^{-2+5} = \boxed{8k^3}$

(16) $\frac{(3z^2)^{-1}}{z^5} = \frac{1}{3z^2\cdot z^5} = \frac{1}{3z^{2+5}} = \boxed{\frac{1}{3z^7}}$

(17) $\frac{3^{-1}\cdot x\cdot y^2}{x^{-4}\cdot y^5} = \frac{x^{1+4}}{3y^{5-2}} = \boxed{\frac{x^5}{3y^3}}$

(18) $\frac{5^{-2}m^2y^{-2}}{5^2m^{-1}y^{-2}} = 5^{-2-2}m^{2+1}y^{-2+2} = 5^{-4}m^3y^0 = \frac{m^3}{5^4} = \boxed{\frac{m^3}{625}}$

(19) $\left(\frac{a^{-1}}{b^2}\right)^{-3} = \frac{a^3}{b^{-6}} = \boxed{a^3b^6}$

(20) $\left(\frac{c^3}{7d^{-2}}\right)^{-2} = \frac{c^{-6}}{49d^4} = \boxed{\frac{49}{c^6d^4}}$

(37) $3^{2/3}\cdot 3^{4/3} = 3^{2/3+4/3} = 3^2 = 9$

(38) $27^{2/3}\cdot 27^{-1/3} = 27^{2/3-1/3} = 27^{1/3} = 3$

(39) $\frac{4^{9/4}\cdot 4^{-7/4}}{4^{-10/4}} = 4^{9/4-7/4+10/4} = 4^3 = \boxed{64}$

(40) $\frac{3^{-5/2}\cdot 3^{3/2}}{3^{7/2}\cdot 3^{-9/2}} = \frac{3^{-5/2+3/2}}{3^{7/2-9/2}} = \frac{3^{-1}}{3^{-2/2}} = 3^{-1+1} = 3^0 = \boxed{1}$

(41) $\left(\frac{x^6y^{-3}}{x^{-2}y^5}\right)^{1/2} = \frac{x^{6\times1/2}y^{-3\times1/2}}{x^{-2\times1/2}y^{5\times1/2}} = \frac{x^3y^{-3/2}}{x^{-1}y^{5/2}} = x^{3+1}y^{-3/2-5/2} = \boxed{\frac{x^4}{y^4}}$

(42) $\left(\frac{a^{-7}b^{-1}}{b^{-4}a^2}\right)^{1/3} = \frac{a^{-7/3}b^{-1/3}}{b^{-4/3}a^{2/3}} = a^{-7/3-2/3}b^{-1/3+4/3} = \boxed{\frac{b^1}{a^3}}$

(43) $\frac{7^{-1/3}\cdot 7r^{-3}}{7^{2/3}\cdot(r^{-2})^2} = 7^{-1/3+1-2/3}r^{-3+4} = 7^0r^1 = \boxed{r}$

(44) $\frac{12^{3/4}\cdot 12^{5/4}\cdot y^{-2}}{12^{-1}\cdot(y^{-3})^{-2}} = 12^{3/4+5/4+1}y^{-2-6} = 12^3y^{-8} = \boxed{\frac{12^3}{y^8}}$

(45) $\frac{3k^2\cdot(4k^{-3})^{-1}}{4^{1/2}\cdot k^{7/2}} = 3\cdot4^{-1-1/2}k^{3-7/2} = \frac{3k^{9/2}}{4^{3/2}} = \frac{3\sqrt{k^9}}{\sqrt{4^3}} = \boxed{\frac{3k^{3/2}}{8}}$

(46) $\frac{8p^{-3}\cdot(4p^2)^{-2}}{p^{-5}} = 4^{-2}\cdot8p^{-3-4+5} = \frac{8p^{-2}}{16} = \boxed{\frac{1}{2p^2}}$

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(47) $\dfrac{a^{4/3}\cdot b^{1/2}}{a^{2/3}\cdot b^{-3/2}} = a^{4/3-2/3}\, b^{1/2+3/2} = \boxed{a^{2/3} b^{2}}$

(48) $\dfrac{x^{3/2}\cdot y^{4/5}\cdot z^{-3/4}}{x^{5/3}\cdot y^{-6/5}\cdot z^{1/2}} = \dfrac{y^{4/5+6/5}}{x^{5/3-3/2}\cdot z^{1/2+3/4}} = \dfrac{y^{2}}{x^{1/6}\cdot z^{5/4}} = \boxed{\dfrac{y^{2}}{x^{1/6}\cdot z^{5/4}}}$

(49) $\dfrac{k^{-3/5}\cdot h^{-1/3}\cdot t^{2/5}}{k^{-1/5}\cdot h^{-2/3}\cdot t^{1/5}} = k^{-3/5+1/5}\cdot h^{-1/3+2/3}\cdot t^{2/5-1/5} = \boxed{\dfrac{h^{1/3}\cdot t^{1/5}}{k^{2/5}}}$

(50) $\dfrac{m^{7/3}\cdot n^{-2/5}\cdot p^{3/8}}{m^{-2/3}\cdot n^{3/5}\cdot p^{-5/8}} = \dfrac{m^{7/3+2/3}\, p^{3/8+5/8}}{n^{3/5+2/5}} = \boxed{\dfrac{m^{3}\, p}{n}}$

(Ex. R. 4)

(1) $2x+8 = x-4$

$2x-x = -4-8$

$\boxed{x = -12}$

(2) $5x+2 = 8-3x$

$5x+3x = 8-2$

$8x = 6$

$\boxed{x = 3/4}$

(3) $0.2m-0.5 = 0.1m+0.7$

$0.2m-0.1m = 0.7+0.5$

$0.1m = 1.2$

$\boxed{m = 12}$

(4) $\frac{2}{3}k - k + \frac{3}{8} = \frac{1}{2}$

$\frac{2-3}{3}k = \frac{1}{2}-\frac{3}{8}$

$\frac{-1}{3}k = \frac{4-3}{8}$

$-\frac{1}{3}k = \frac{1}{8}$

$\boxed{k = -\frac{3}{8}}$

(5) $3r+2-5(r+1) = 6r+4$

$3r+2-5r-5 = 6r+4$

$6r+2r = 2-5-4$

$8r = -7$

$\boxed{r = -7/8}$

(6) $5(a+3)+4a-5 = -(2a-4)$

$5a+15+4a-5 = -2a+4$

$9a+10 = -2a+4$

$9a+2a = 4-10$

$11a = -6$

$\boxed{a = -6/11}$

(7) $2[3m-2(3-m)-4] = 6m-4$

$2[3m-6+2m-4] = 6m-4$

$2[5m-10] = 6m-4$

$10m-20 = 6m-4$

$10m-6m = 20-4$

$4m = 16$

$\boxed{m = 4}$

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↓ Factorization by Quadratic Formula:

(8) $4[2p-(3-p)+5]=-7p-2$

Sol.

$4(2p-3+p+5)=-7p-2$

$8p-12+4p+20=-7p-2$

$12p+8=-7p-2$

$12p+7p=-8-2$

$19p=-10$

$\boxed{p=\frac{-10}{19}}$

(9) $x^2+5x+6=0$

$a=1,\ b=5,\ c=6.$

$x=\frac{-5\pm\sqrt{25-24}}{2}$

$x=\frac{-5\pm1}{2}$

$x=\frac{-5+1}{2}$ | $x=\frac{-5-1}{2}$

$\boxed{x=-2}$ $\boxed{x=-3}$

(10) $x^2=3+2x$

$x^2-2x-3=0$

$x=\frac{+2\pm\sqrt{4+12}}{2}$

$x=\frac{2\pm\sqrt{16}}{2}$

$x=\frac{2\pm4}{2}$

$x=\frac{2+4}{2}$ | $x=\frac{2-4}{2}$

$\boxed{x=3}$ $\boxed{x=-1}$

(11) $m^2=14m-49$

$m^2-14m+49=0$

$x=\frac{+14\pm\sqrt{196-196}}{2}$

$\boxed{x=\frac{14}{2}=7}$

(12) $2x^2-x=10$

$2x^2-x-10=0$

$x=\frac{+1\pm\sqrt{1+80}}{4}$

$x=\frac{1\pm\sqrt{81}}{4}$

$x=\frac{1+9}{4}$ | $x=\frac{1-9}{4}$

$\boxed{x=\frac{5}{2}}$ $\boxed{x=-2}$

(13) $12x^2-5x=2$

$12x^2-5x-2=0$

$x=\frac{+5\pm\sqrt{25+96}}{24}$

$x=\frac{5\pm\sqrt{121}}{24}$

$x=\frac{5\pm11}{24}$

$x=\frac{5+11}{24}$ | $x=\frac{5-11}{24}$

$\boxed{x=\frac{2}{3}}$ $\boxed{x=-1/4}$

(14) $m(m-7)=-10$

$m^2-7m+10=0$

$x=\frac{+7\pm\sqrt{49-40}}{2}$

$x=\frac{+7\pm\sqrt{9}}{2}$

$x=\frac{7\pm3}{2}$

$x=\frac{7+3}{2}$ | $x=\frac{7-3}{2}$

$\boxed{x=5}$ $\boxed{x=2}$

(15) $4x^2-36=0$

$4(x^2-9)=0$

$\sqrt{x^2}=\sqrt{9}$

$x=\pm3$

$\boxed{x=\pm3}$

(16) $z(2z+7)=4$

$2z^2+7z-4=0$

$x=\frac{-7\pm\sqrt{49+32}}{4}$

$x=\frac{-7\pm\sqrt{81}}{4}$

$x=\frac{-7\pm9}{4}$

$x=\frac{-7+9}{4}$ | $x=\frac{-7-9}{4}$

$\boxed{x=\frac{1}{2}}$ $\boxed{x=-4}$

(17) $12y^2-48y=0$

$12y(y-4)=0$

$y-4=0$

$\boxed{y=4}$

$12y=0$

$\boxed{y=0}$

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(18) $3x^2 - 5x + 1 = 0$

$x = \frac{+5 \pm \sqrt{25-12}}{6}$

$x = \frac{+5 \pm \sqrt{13}}{6}$

$x = \frac{+5+\sqrt{13}}{6}$ | $x = \frac{5-\sqrt{13}}{6}$

$\boxed{x = 1.43}$ | $\boxed{x = 0.232}$

(19) $2m^2 - 4m = 3$

$2m^2 - 4m - 3 = 0$

$x = \frac{+4 \pm \sqrt{16+24}}{4}$

$x = \frac{4 \pm \sqrt{40}}{4}$

$x = \frac{4 \pm 2\sqrt{10}}{4}$

$\boxed{x = 1 \pm \frac{\sqrt{10}}{2}}$

(20) $p^2 + p - 1 = 0$

$x = \frac{-1 \pm \sqrt{(1)^2 + 4}}{2}$

$x = \frac{-1 \pm \sqrt{5}}{2}$

$\boxed{x = \frac{-1 \pm \sqrt{5}}{2}}$

(21) $k^2 - 10k = -20$

$k^2 - 10k + 20 = 0$

$x = \frac{10 \pm \sqrt{100-80}}{2}$

$x = \frac{10 \pm \sqrt{20}}{2}$

$x = \frac{10 \pm 2\sqrt{5}}{2}$

$\boxed{x = 5 \pm \sqrt{5}}$

(22) $5x^2 - 8x + 2 = 0$

$x = \frac{8 \pm \sqrt{64-40}}{10}$

$x = \frac{8 \pm \sqrt{24}}{10}$

$x = \frac{8 \pm 2\sqrt{6}}{10}$

$\boxed{x = \frac{4 + \sqrt{6}}{5}}$

(23) $2r^2 - 7r + 5 = 0$

$x = \frac{7 \pm \sqrt{49-40}}{4}$

$x = \frac{7 \pm \sqrt{9}}{4}$

$x = \frac{7 \pm 3}{4}$

$x = \frac{7+3}{4}$ | $x = \frac{7-3}{4}$

$\boxed{x = \frac{5}{2}}$ | $\boxed{x = 1}$

(24) $2x^2 - 7x + 30 = 0$

$x = \frac{7 \pm \sqrt{49-250}}{4}$

$x = \frac{7 \pm \sqrt{-191}}{4}$

$\boxed{\text{No. Solution}}$

(25) $3k^2 + k = 6$

$3k^2 + k - 6 = 0$

$x = \frac{-1 \pm \sqrt{1+72}}{6}$

$\boxed{x = \frac{-1 \pm \sqrt{73}}{6}}$

(26) $5m^2 + 5m = 0$

$5m(m+1) = 0$

$5m = 0$

$\boxed{m = 0}$

$m + 1 = 0$

$\boxed{m = -1}$

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(27) $\frac{3x-2}{7} = \frac{x+2}{5}$

$5(3x-2) = 7(x+2)$

$15x - 10 = 7x + 14$

$15x - 7x = 14 + 10$

$8x = 24$

$\boxed{x = 24/8 = 3}$

(28) $\frac{x}{3} - 7 = 6 - \frac{3x}{4}$

$\frac{x-21}{3} = \frac{24-3x}{4}$

$4(x-21) = 3(24-3x)$

$4x - 84 = 72 - 9x$

$4x + 9x = 84 + 72$

$13x = 156$

$\boxed{x = 156/13 = 12}$

(29) $\cancel{\frac{4}{x-3} = \frac{8}{}}$

(29) $\frac{4}{x-3} - \frac{8}{2x+5} + \frac{3}{x-3} = 0$

$\frac{4+3}{x-3} - \frac{8}{2x+5} = 0$

$7(2x+5) - 8(x-3) = 0$

$14x + 35 - 8x + 24 = 0$

$6x + 59 = 0$

$6x = -59$

$\boxed{x = -59/6}$

(30) $\frac{5}{p-2} - \frac{7}{p+2} = \frac{12}{p^2-4}$

$5p + 10 - 7p + 14 = 12$

$-2p + 24 = 12$

$2p = 24 - 12$

$2p = 12$

$\boxed{p = 6}$

(31) $\frac{2m}{m-2} - \frac{6}{m} = \frac{12}{m^2-2m}$

$2m^2 - 6m + 12 = 12$

$2m^2 - 6m = 0$

$2m(m-6) = 0$

$2m = 0$ | $m - 6 = 0$

$\boxed{m = 0}$ | $\boxed{m = 6}$

(32) $\frac{2y}{y-1} = \frac{5}{y} + \frac{10-8y}{y^2-y}$

$\frac{2y}{y-1} = \frac{5}{y} + \frac{10-8y}{y(y-1)}$

$\frac{2y}{y-1} = 5y - 5 + 10 - 8y$

$2y^2 = -3y + 5$

$2y^2 + 3y - 5 = 0$

$x = \frac{-3 \pm \sqrt{9+40}}{4}$

$x = \frac{-3 \pm \sqrt{49}}{4}$

$x = \frac{-3 \pm 7}{4}$

$x = \frac{-3+7}{4}$ | $x = \frac{-3-7}{4}$

$\boxed{x = 1}$ | $\boxed{x = -5/2}$

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

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

$x - 1 - 3x^2 + 6x = 2x + 1$

$3x^2 + 2x - 6x - x + 1 + 1$

$3x^2 - 5x + 2 = 0$

$x = \frac{+5 \pm \sqrt{25-24}}{6}$

$x = \frac{5 \pm 1}{6} = 8$

$x = \frac{5+1}{6}$ | $x = \frac{5-1}{6}$

$\boxed{x = 1}$ | $\boxed{x = \frac{2}{3}}$

(34) $\frac{5}{a} + \frac{-7}{a+1} = \frac{a^2 - 2a + 4}{a^2 + a}$

$5a + 5 - 7a = a^2 - 2a + 4$

$a^2 - \cancel{2a} + \cancel{4} - \cancel{5a} - \cancel{5} + \cancel{7a} = 0$

$a^2 - 1 = 0$

$a^2 = 1$

$\boxed{a = \pm 1}$

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(35) $\frac{5}{b+5} - \frac{4}{b^2+2b} = \frac{6}{b^2+7b+10}$

$\frac{5}{b+5} - \frac{4}{b(b+2)} = \frac{6}{b^2+7b+10}$

$5b(b+2) - 4(b+5) = 6b$

$5b^2+10b-4b-20 = 6b$

$5b^2+\cancel{6b}-\cancel{6b}-20=0$

$5b^2-20=0$

$5(b^2-4)=0$

$b^2-4=0$

$b^2=4$

$\boxed{b=\pm 4}$

(36) $\frac{2}{x^2-2x-3} + \frac{5}{x^2-x-6} = \frac{1}{x^2+3x+2}$

$\frac{2}{x^2-3x+x-3} + \frac{5}{x^2-3x+2x-6} = \frac{1}{x^2+2x+x+2}$

$\frac{2}{(x-3)(x+1)} + \frac{5}{(x-3)(x+2)} = \frac{1}{(x+1)(x+2)}$

$2(x+2)+5(x+1) = x-3$

$2x+4+5x+5 = x-3$

$7x+9 = x-3$

$7x-x+9+3=0$

$6x+12=0$

$\boxed{x=-2}$

No solution.

(37) $\frac{4}{2x^2+3x-9} + \frac{2}{2x^2-x-3} = \frac{3}{x^2+4x+3}$

$\frac{4}{(2x-3)(x+3)} + \frac{2}{(2x-3)(x+1)} = \frac{3}{(x+1)(x+3)}$

$4(x+1)+2(x+3) = 3(2x-3)$

$4x+4+2x+6 = 6x-9$

$\cancel{6x}-\cancel{6x}+10+9=0$

$\boxed{19=0}$

No solution.

—(Ex # R.3)—

① $\frac{5v^2}{35v} = \frac{\cancel{5}v^{\cancel{2}}}{\cancel{5}\cdot 7\cancel{v}} = \boxed{\frac{v}{7}}$

② $\frac{25p^3}{10p^2} = \frac{5p^2\cdot 5p}{5p^2\cdot 2} = \boxed{\frac{5p}{2}}$

③ $\frac{8k+16}{9k+18} = \frac{8\cancel{(k+2)}}{9\cancel{(k+2)}} = \boxed{\frac{8}{9}}$

④ $\frac{2\cancel{(t-15)}}{\cancel{(t-15)}(t+2)} = \boxed{\frac{2}{(t+2)}}$

(5) $\frac{4x^3-8x^2}{4x^2} = \frac{4x^2(x-2)}{4x^2} = \boxed{x-2}$

(6) $\frac{36y^2+72y}{9y} = \frac{36y(y+2)}{9y} = \boxed{4y+8}$

(7) $\frac{m^2-4m+4}{m^2+m-6} = \frac{(m-2)\cancel{(m-2)}}{(m+3)\cancel{(m-2)}} = \boxed{\frac{m-2}{m+3}}$

(8) $\frac{r^2-r-6}{r^2+r-12} = \frac{\cancel{(r-3)}(r+2)}{(r+4)\cancel{(r-3)}}$

$= \boxed{\frac{r+2}{r+4}}$

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

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

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

$= \boxed{\frac{3(x-1)}{x-2}}$

(10) $\frac{z^2-5z+6}{z^2-4}$

$= \frac{(z-2)(z-3)}{(z+2)(z-2)}$

$= \boxed{\frac{z-3}{z+2}}$

(11) $\frac{m^4-16}{4m^2-16}$

$= \frac{(m^2+4)(m^2-4)}{4(m^2-4)}$

$= \frac{(m^2+4)(m^2-4)}{4(m^2-4)}$

$= \boxed{\frac{m^2+4}{4}}$

(12) $\frac{6y^2+11y+4}{3y^2+7y+4} = \frac{6y^2+3y+8y+4}{3y^2+3y+4y+4}$

$= \frac{3y(2y+1)+4(2y+1)}{3y(y+1)+4(y+1)}$

$= \frac{(3y+4)(2y+1)}{(3y+4)(y+1)}$

$= \boxed{\frac{2y+1}{y+1}}$

(13) $\frac{\cancel{9}^{3}k^{\cancel{2}}}{\cancel{25}_{5}} \cdot \frac{\cancel{5}}{\cancel{3}k} \Rightarrow \frac{3k}{5}$

(14) $\frac{15p^3}{9p^2} \div \frac{6p}{10p^2} = \frac{\cancel{15}^{5}p^{\cancel{3}}}{\cancel{9p^2}} \times \frac{\cancel{10}^{5}p^{\cancel{2}}}{\cancel{6p}_{2}} = \boxed{\frac{25p^2}{9}}$

(15) $\frac{3(a+b)}{\cancel{14}c} \cdot \frac{\cancel{12}^{3}}{5(a+b)}$

$= \boxed{\frac{9}{5c}}$

(16) $\frac{a-3}{16} \div \frac{a-3}{32}$

$\frac{\cancel{a-3}}{\cancel{16}} \times \frac{\cancel{32}^{2}}{\cancel{a-3}} \Rightarrow \boxed{2}$

(17) $\frac{2k-16}{6} \div \frac{4k-32}{3}$

$= \frac{\cancel{2}(\cancel{k-8})}{\cancel{6}_{2}} \times \frac{\cancel{3}}{\cancel{4}_{2}(\cancel{k-8})}$

$= \boxed{\frac{1}{4}}$

(18) $\frac{9y-18}{6y+12} \cdot \frac{3y+6}{15y-30}$

$= \frac{\cancel{9}^{3}(\cancel{y-2})}{\cancel{6}_{2}(\cancel{y+2})} \cdot \frac{\cancel{3}(\cancel{y+2})}{\cancel{15}_{5}(\cancel{y-2})}$

$= \boxed{\frac{3}{10}}$

(19) $\frac{4a+12}{2a-10} \div \frac{a^2-9}{a^2-a-20}$

$= \frac{4(a+3)}{2(a-5)} \times \frac{(a-5)(a+4)}{(a-3)(a+3)}$

$= \boxed{\frac{2(a+4)}{a-3}}$

(20) $\frac{6r-18}{9r^2+6r-24} \cdot \frac{12r-16}{4r-12} \Rightarrow \frac{\cancel{6}^{2}(\cancel{r-3})}{\cancel{3}(\cancel{3r-4})(r+2)} \cdot \frac{\cancel{4}(\cancel{3r-4})}{\cancel{4}(\cancel{r-3})}$

$\Rightarrow \boxed{\frac{2}{r+2}}$

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(21) $\frac{k^2+4k-12}{k^2+10k+24} \cdot \frac{k^2+k-12}{k^2-9}$

$\frac{(k+6)(k-2)}{(k+6)(k+4)} \cdot \frac{(k+4)(k-3)}{(k+3)(k-3)}$

$\frac{(k-2)}{1} \cdot \frac{1}{(k+3)}$

$\boxed{\frac{k-2}{k+3}}$

(22) $\frac{m^2+3m+2}{m^2+5m+4} \div \frac{m^2+5m+6}{m^2+10m+24}$

$\frac{m^2+3m+2}{m^2+5m+4} \cdot \frac{m^2+10m+24}{m^2+5m+6}$

$\frac{(m+2)(m+1)}{(m+4)(m+1)} \cdot \frac{(m+6)(m+4)}{(m+2)(m+3)}$

$\boxed{\frac{m+6}{m+3}}$

(23) $\frac{2m^2-5m-12}{m^2-10m+24} \div \frac{4m^2-9}{m^2-9m+18}$

$\frac{2m^2-5m-12}{m^2-10m+24} \cdot \frac{m^2-9m+18}{4m^2-9}$

$\frac{(2m+3)(m-4)}{(m-6)(m-4)} \cdot \frac{(m-6)(m-3)}{(2m+3)(2m-3)}$

$\boxed{\frac{m-3}{2m-3}}$

(24) $\frac{4n^2+4n-3}{6n^2-n-15} \cdot \frac{8n^2+32n+30}{4n^2+16n+15}$

$\frac{(2n+3)(2n-1)}{(3n-5)(2n+3)} \cdot \frac{2(4n^2+16n+15)}{4n^2+16n+15}$

$\boxed{\frac{2(2n-1)}{3n-5}}$

(25) $\frac{a+1}{2} - \frac{a-1}{2}$

$\frac{a+1-a+1}{2}$

$\frac{2}{2} = 1$

(26) $\frac{3}{p} + \frac{1}{2}$

$\frac{3(2)+1(p)}{2p}$

$\boxed{\frac{6+p}{2p}}$

(27) $\frac{6}{5y} - \frac{3}{2}$

$\frac{6(2)-3(5y)}{10y}$

$\boxed{\frac{12-15y}{10y}}$

(28) $\frac{1}{6m} + \frac{2}{5m} + \frac{4}{m}$

$\frac{1(5)+2(6)+4(30)}{30m}$

$\frac{5+12+120}{30m}$

$\boxed{\frac{137}{30m}}$

(29) $\frac{1}{m-1} + \frac{2}{m}$

$\frac{m+2m+2}{m(m-1)}$

$\boxed{\frac{3m-2}{m^2-m}}$

(30) $\frac{5}{2r+3} - \frac{2}{r}$

$\frac{5(r)-2(2r+3)}{r(2r+3)}$

$\frac{5r-4r-6}{2r^2+3r} = \boxed{\frac{r-6}{2r^2+3r}}$

(31) $\frac{8}{3(a-1)} + \frac{2}{a-1}$

$\frac{8+2(3)}{3(a-1)} = \frac{8+6}{3(a-1)}$

$= \boxed{\frac{14}{3a-3}}$

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(32) $\frac{2}{5(k-2)} + \frac{3}{4(k-2)}$

$\frac{2(4)+3(5)}{20(k-2)}$

$\frac{8+15}{20(k-2)} = \boxed{\frac{23}{20(k-2)}}$

(33) $\frac{4}{x^2+4x+3} + \frac{3}{x^2-x-2}$

$\frac{4}{(x+3)(x+1)} + \frac{3}{(x-2)(x+1)}$

$= \frac{4(x-2)+3(x+3)}{(x+3)(x-2)(x+1)}$

$= \frac{4x-8+3x+9}{(x+3)(x-2)(x+1)}$

$= \boxed{\frac{7x+1}{(x+3)(x-2)(x+1)}}$

(34) $\frac{y}{y^2+2y-3} - \frac{1}{y^2+4y+3}$

$\frac{y}{(y-1)(y+3)} - \frac{1}{(y+1)(y+3)}$

$= \frac{y(y+1)-1(y-1)}{(y+3)(y-1)(y+3)}$

$= \frac{y^2+y-y+1}{(y+3)(y-1)(y+3)}$

$= \boxed{\frac{y^2+1}{(y+3)(y-1)(y+3)}}$

(35) $\frac{3k}{2k^2+3k-2} - \frac{2k}{2k^2-7k+3}$

$\frac{3k}{(2k-1)(k+2)} - \frac{2k}{(2k-1)(k-3)}$

$\frac{3k(k-3)-2k(k+2)}{(2k-1)(k+2)(k-3)}$

$\frac{3k^2-9k-2k^2-4k}{(2k-1)(k+2)(k-3)}$

$\boxed{\frac{k^2-13k}{(2k-1)(k+2)(k-3)}}$

(36) $\frac{4m}{3m^2+7m-6} - \frac{m}{3m^2-14m+8}$

$\frac{4m}{(3m-2)(m+3)} - \frac{m}{(m-4)(3m-2)}$

$\frac{4m(m-4)-m(m+3)}{(3m-2)(m+3)(m-4)}$

$\Rightarrow \frac{4m^2-16m-m^2-3m}{(3m-2)(m+3)(m-4)}$

$= \boxed{\frac{3m^2-19m}{(3m-2)(m+3)(m-4)}}$

(37) $\frac{2}{a+2} + \frac{1}{a} + \frac{a-1}{a^2+2a}$

$\frac{2}{a+2} + \frac{1}{a} + \frac{a-1}{a(a+2)}$

$\frac{2a+a+2+a-1}{a(a+2)}$

$\boxed{\frac{4a+1}{a(a+2)}}$

(38) $\frac{5x+2}{x^2-1} + \frac{3}{x^2+x} - \frac{1}{x^2-x}$

$\frac{5x+2}{(x-1)(x+1)} + \frac{3}{x(x+1)} - \frac{1}{x(x-1)}$

$= \frac{(5x+2)x+3(x-1)-1(x+1)}{x(x-1)(x+1)}$

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

$\boxed{= \frac{5x^2+4x-4}{x(x-1)(x+1)}}$

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CH # R.

Date:

—(Ex. R.2)—

(1) $7a^3+14a^2$

$\boxed{7a^2(a+2)}$

(2) $3y^3+24y^2+9y$

$\boxed{3y(y^2+8y+3)}$

(3) $13p^4q^2-39p^3q+26p^2q^2$

$\boxed{13p^2q(p^2q-3p+2q)}$

(4) $60m^4-120m^3n+50m^2n^2$

$\boxed{10m^2(6m^2-12mn+5n^2)}$

(5) $m^2-5m-14$

$\boxed{(m-7)(m+2)}$

(6) x^2+4x-5

$\boxed{(x+5)(x-1)}$

(7) $z^2+9z+20$

$\boxed{(z+5)(z+4)}$

(8) b^2-8b+7

$\boxed{(b-7)(b-1)}$

(9) $a^2-6ab+5b^2$

$\boxed{(a-5b)(a-b)}$

(10) $s^2+2st-35t^2$

$\boxed{(s+7t)(s-5t)}$

(11) $y^2-4yz-21z^2$

$\boxed{(y-7z)(y+3z)}$

(12) $3x^2+4x-7$

$\boxed{(3x+7)(x-1)}$

(13) $3a^2+10a+7$

$\boxed{(3a+7)(a+1)}$

(14) $15y^2+y-2$

$\boxed{(3y-1)(5y+2)}$

(15) $21m^2+13mn+2n^2$

$\boxed{(7m+2n)(3m+n)}$

(16) $6a^2-48a-120$

$\boxed{6(a-10)(a+2)}$

(17) $3m^3+12m^2+9m$

$\boxed{3m(m+3)(m+1)}$

(18) $4a^2+10a+6$

$\boxed{2(2a+3)(a+1)}$

(19) $24a^4+10a^3b-4a^2b^2$

$\boxed{2a^2(4a-b)(3a+2b)}$

(20) $24x^4+36x^3y-60x^2y^2$

$\boxed{12x^2(2x+5y)(x-y)}$

(21) x^2-64

$\boxed{(x+8)(x-8)}$

(22) $9m^2-25$

$\boxed{(3m+5)(3m-5)}$

(23) $10x^2-160$

$\boxed{10(x+4)(x-4)}$

(24) $9x^2+64$

$\boxed{\text{Non-factor Number (prime)}}$

(25) $z^2+14zy+49y^2$

$\boxed{(z+7y)^2}$

(26) $s^2-10st+25t^2$

$\boxed{(s-5t)^2}$

(27) $9p^2-24p+16$

$\boxed{(3p-4)^2}$

(28) a^3-216

$\boxed{(a-6)(a^2+6a+36)}$

(29) $27r^3-64s^3$

$\boxed{(3r-4s)(9r^2+12rs+16s^2)}$

(30) $3m^3+375$

$3(m^3+125)$

$\boxed{3(m+5)(m^2-5m+25)}$

(31) x^4-y^4

$(x^2+y^2)(x^2-y^2)$

$\boxed{(x^2+y^2)(x+y)(x-y)}$

(32) $16a^4-81b^4$

$(4a^2+9b^2)(4a^2-9b^2)$

$\boxed{(4a^2+9b^2)(2a+3b)(2a-3b)}$

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Ch # R

(Ex ⇒ R.1)

Date:

① $(2x^2-6x+11)+(-3x^2+7x-2)$

$\boxed{-x^2+x+9}$

② $(-4y^2-3y+8)-(2y^2-6y-2)$

$\boxed{-4y^2-3y+8-2y^2+6y+2}$

$(-4y^2-2y^2)+(-3y+6y)+(8+2)$

$\boxed{-6y^2+3y+10}$

③ $-6(2q^2+4q-3)+4(-q^2+7q-3)$

$-12q^2-24q+18-4q^2+28q-12$

$(-12q^2-4q^2)+(-24q+28q)+(18-12)$

$\boxed{16q^2+4q+6}$

④ $2(3r^2+4r+2)-3(-r^2+4r-5)$

$6r^2+8r+4+3r^2-12r+15$

$(6r^2+3r^2)+(8r-12r)+(4+15)$

$\boxed{9r^2-4r+19}$.

⑤ $0.5(5r^2+3.2r-6)-(1.7r^2-2r-1.5)$

$2.5r^2+1.6r-3-1.7r^2+2r+1.5$

$(2.5r^2-1.7r^2)+(1.6r+2r)+(-3+1.5)$

$\boxed{0.8r^2+3.6r-1.5}$

⑦ $-9m(2m^2+3m-1)$

$\boxed{-18m^3-27m^2+9m}$.

⑤ $(0.613x^2-4.215x+0.892)-0.47(2x^2-3x+5)$

$0.613x^2-4.215x+0.892-0.94x^2+1.41x-2.35$

$(0.613x^2-0.94x^2)+(-4.215x+1.41x)+(0.892-2.35)$

$\boxed{-0.327x^2-2.805x-1.458}$

⑧ $6x(-2x^3+5x+6)$

$\boxed{-12x^4+30x^2+36x}$

⑨ $(3t-2y)(3t+5y)$

$\boxed{9t^2+9ty-10y^2}$

⑩ $(9k+q)(9k-q)$

$18k^2-9kq+2kq-q^2$

$\boxed{18k^2-7kq-q^2}$

⑪ $(2-3x)(2+3x)$

$\boxed{4-9x^2}$

⑫ $(6m+5)(6m-5)$

$\boxed{36m^2-25}$

⑬ $\left(\frac{2}{5}y+\frac{1}{8}z\right)\left(\frac{3}{5}y+\frac{1}{2}z\right)$

$\boxed{\frac{6}{25}y^2+\frac{11}{40}yz+\frac{1}{16}z^2}$

⑭ $\left(\frac{3}{4}r-\frac{2}{3}s\right)\left(\frac{5}{4}r-\frac{1}{3}s\right)$

$\boxed{\frac{15}{16}r^2-\frac{7}{12}rs-\frac{2}{9}s^2}$

⑮ $(3p-1)(9p^2+3p+1)$

$\boxed{27p^3-1}$

⑯ $(3p+2)(5p^2+p-4)$

$\boxed{15p^3+13p^2-10p-8}$

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(17) $(2m+1)(4m^2-2m+1)$

$\boxed{8m^3+1}$

(18) $(k+2)(12k^3-3k^2+k+1)$

$12k^4+24k^3-6k^2-3k^3+3k+k^2+2$

$12k^4-3k^3+24k^3+k^2-6k^2+3k+2$

$12k^4+(-3+24)k^3+(1-6)k^2+3k+2$

$\boxed{12k^4+21k^3-5k^2+3k+2}$

(19) $(x+y+z)(3x-2y-z)$

$3x^2-2xy-xz+3xy-2y^2-yz+3xz-2yz-z^2$

$\boxed{3x^2+2xz+xy-2y^2-z^2-3yz}$

(20) $(r+2s-3t)(2r-2s+t)$

$2r^2+4rs-2rs-6rt+rt-4s^2-3t^2+6st+2st$

$\boxed{2r^2+2rs-5rt-4s^2-3t^2+8st}$

(21) $(x+1)(x+2)(x+3)$

$(x^2+3x+2)(x+3)$

$x^3+3x^2+3x^2+9x+2x+6$

$\boxed{x^3+6x^2+11x+6}$

(22) $(x-1)(x+2)(x-3)$

$(x^2+x-2)(x-3)$

$x^3-3x^2+x^2-3x-2x+6$

$\boxed{x^3-2x^2-5x+6}$

(23) $(x+2)^2$

$\boxed{(x^2+4x+4)}$

(24) $(2a-4b)^2$

$\boxed{4a^2-16ab+16b^2}$

(25) $(x-2y)^3$

$(x-2y)(x^2-4xy+4y^2)$

$\boxed{(x^3-6x^2y+12xy^2-8y^3)}$

(26) $(3x+y)^3$

$(3x+y)(9x^2+6xy+y^2)$

$\boxed{27x^3+27x^2y+9xy^2+y^3}$

THE END