Midterm I Solution

#1. $(x^2-2x+1)(x-2) = x^3-2x^2+1x-2x^2+4x-14$

$= \underline{x^3-4x^2+11x-14}$ Answer

#2. $(y^3+4y^2-8)(2y-1) = 2y^4+8y^3-16y-y^3-4y^2+8$

$= \underline{2y^4+7y^3-4y^2-16y+8}$ Answer

#3. $\frac{2x^{-2}y}{8xy} = \frac{1}{4}\cdot\frac{x}{8}\cdot\underbrace{x^{-2}}_{\frac{1}{x^2}}\cdot\frac{1}{x}\cdot\frac{y}{y} = \frac{1}{4}\cdot\frac{1}{x^2}\cdot\frac{1}{x} = \underline{\frac{1}{4x^3}}$ Answer

#4. $(-5x^{-2}y)(-2x^{-2}y^2) = (-5)\cdot\frac{1}{x^2}\cdot y\cdot(-2)\cdot\frac{1}{x^2}y^2 = 10\cdot\frac{1}{x^4}\cdot y^3 = \underline{\frac{10y^3}{x^4}}$ Answer

#5. $0.\underbrace{00000001}$ $= \underline{6.01\times10^{-7}}$ Answer

move the decimal point for 7 digits to the right

#6. $\overbrace{819000000.}$ $= \underline{8.19\times10^{8}}$ Answer

move the decimal point for 8 digits to the left

#7. $3y^4-8y = \underline{3y(y^3-3)}$ Answer

#8. $8a^2x-24a^3x^3 = \underline{8a^2x(1-3ax^2)}$ Answer

#9. $\frac{x}{4-x}-\frac{4}{x^2-16} = -\frac{x(x+4)}{(x-4)(x+4)}-\frac{4}{x^2-16} = -\frac{x^2+4x+4}{(x-4)(x+4)}$

$= \underline{\frac{-(x+2)^2}{(x-4)(x+4)}}$ Answer

#10. $\frac{1}{x+2}-\frac{3x}{x^2+4x+4} = \frac{x+2}{(x+2)^2}-\frac{3x}{x^2+4x+4} = \frac{x+2-3x}{(x+2)^2}$

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

#11. $\dfrac{4x^2-4y^2}{6x^2y^2} \div \dfrac{3x^2+3xy}{2x^2y-2xy^2} = \dfrac{4x^2-4y^2}{6x^2y^2} \times \dfrac{2x^2y-2xy^2}{3x^2+3xy}$

$= \dfrac{4(x+y)(x-y)}{3(xy)(xy)} \times \dfrac{2xy(x-y)}{3x(x+y)} = \dfrac{4(x-y)^2}{9x^2y}$

Answer

#12. $\dfrac{3x^2-10x-8}{6x^2+13x+6} \div \dfrac{2x^2-9x+10}{4x^2-4x-15} = \dfrac{3x^2-10x-8}{6x^2+13x+6} \times \dfrac{4x^2-4x-15}{2x^2-9x+10}$

$3x^2-10x-8 = (3x+2)(x-4)$

$3 \quad 2 \quad 2$

$1 \quad -4 \quad -12$

$\quad\quad -10$

$6x^2+13x+6 = (2x+3)(3x+2)$

$2 \quad 3 \quad 9$

$3 \quad 2 \quad 4$

$\quad\quad 13$

$4x^2-4x-15 \quad (2x+3)(2x-5)$

$2 \quad 3 \quad 6$

$2 \quad -5 \quad -10$

$\quad\quad -4$

$2x^2-9x+10 \quad (2x-5)(x-2)$

$2 \quad -5 \quad -5$

$1 \quad -2 \quad -4$

$\quad\quad -9$

$= \dfrac{(3x+2)(x-4)}{(2x+3)(3x+2)} \times \dfrac{(2x+3)(2x-5)}{(2x-5)(x-2)}$

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

Answer

Part II

#15 C is a zero of $f(x)$

$\Leftrightarrow f(C) = 0.$

$\Leftrightarrow C^2+3C-18 = 0$

$\Leftrightarrow (C+6)(C-3) = 0$

$\Leftrightarrow C = -6$ or $C = 3.$ Answer

#13. $\dfrac{2-\frac{4}{x+2}}{5-\frac{10}{x+2}} = \dfrac{\left(2-\frac{4}{x+2}\right)\cdot(x+2)}{\left(5-\frac{10}{x+2}\right)\cdot(x+2)} = \dfrac{2(x+2)-4}{5(x+2)-10} = \dfrac{2x+4-4}{5x+10-10} = \dfrac{2x}{5x} = \dfrac{2}{5}$

Answer

#14 $\dfrac{1-\frac{3}{x}-\frac{10}{x^2}}{1+\frac{11}{x}+\frac{18}{x^2}} = \dfrac{\left(1-\frac{3}{x}-\frac{10}{x^2}\right)\cdot x^2}{\left(1+\frac{11}{x}+\frac{18}{x^2}\right)\cdot x^2} = \dfrac{x^2-3x-10}{x^2+11x+18} = \dfrac{(x-5)(x+2)}{(x+2)(x+9)}$

$= \dfrac{x-5}{x+9}.$

Answer