INTERMEDIATE ALGEBRA   EXAM 2 CR NAME _____

SHOW ALL WORK ON THIS TEST OR ON SEPARATE PAPER. Circle answers.
TURN IN **ALL** WORKSHEETS. CALCULATORS ARE PERMITTED ON THIS TEST.

$$X^3 - Y^3 = (X - Y)(X^2 + XY + Y^2)$$
$$X^3 + Y^3 = (X + Y)(X^2 - XY + Y^2)$$

In 1-6, factor completely:

1. $X^2 - 13X - 30$ 2. $16X^2 - 24X + 9$ 3. $(Junk)^2 - 16(Junk)$

4. $2X^3Y^3 - 250X^3$ 5. $X^4 - 81$ 6. $(X-3Y)^2 - 5(X-3Y) - 6$

In 7-8, solve for X:

7. $X^2 + 14X = 0$ 8. $X^3 + 3X^2 = 16X + 48$

In 9-12, perform the indicated operations (add, subtract, multiply,
        or divide.)   REDUCE ALL FRACTIONS COMPLETELY!

9. $\dfrac{X^2 - 2X - 3}{X^4 - 10X^2 + 9}$ 10. $\dfrac{X^3 - 64}{X^4 - 2X^3 - 8X^2} \div \dfrac{X^3 + 4X^2}{X^2 + 6X + 8}$

11. $\dfrac{X}{X^2 - 9} - \dfrac{3}{5X - 15}$

12. $\dfrac{X + 6}{X^2 + X - 12} + \dfrac{5}{X^2 - 6X + 9}$

13. Solve the equation for X:

$$\dfrac{X}{X^2 - X - 6} + \dfrac{3}{X^2 - 5X + 6} = -\dfrac{2}{X^2 - 4}$$

14. Y varies directly as X and inversely as the square of Z. If Y=18 when X=12 and Z=2, find Y when X=9 and Z=4.

In 15 - 18, simplify the complex fractions:

15. $$\dfrac{\dfrac{4}{x} - \dfrac{6}{y}}{\dfrac{8}{x} + \dfrac{2}{y}}$$

16. $$\dfrac{\dfrac{1}{x} - \dfrac{1}{x+2}}{\dfrac{1}{x} + \dfrac{1}{x-2}}$$

17. $$\dfrac{x^{-1} - y^{-1}}{x^{-2} - y^{-2}}$$

18. $(x^{-2} - y^{-2})^{-1}$

Solve for x:

19. $A = \dfrac{2xy}{4 + x}$

Use synthetic division:

20. $\dfrac{x^3 + 3x^2 - 10x - 4}{x + 2}$

INTERMEDIATE ALG. EXAM 2 CR* Solutions

1. $x^2 - 13x - 30$
$= \boxed{(x-15)(x+2)}$

2. $16x^2 - 24x + 9$
$= \boxed{(4x-3)^2}$

3. $(junk)^2 - 16(junk)$
$= \boxed{(junk)(junk-16)}$

4. $2x^3y^3 - 250x^3$
$= 2x^3(y^3 - 125)$
$= \boxed{2x^3(y-5)(y^2+5y+25)}$

5. $x^4 - 81$
$= (x^2-9)(x^2+9)$
$= \boxed{(x-3)(x+3)(x^2+9)}$

6. $(x-3y)^2 - 5(x-3y) - 6$
$\boxed{[(x-3y)-6][(x-3y)+1]}$
$= \boxed{(x-3y-6)(x-3y+1)}$

7. $x^2 + 14x = 0$
$x(x+14) = 0$
$\boxed{x=0 \quad x=-14}$

8. $x^3 + 3x^2 - 16x - 48 = 0$
$x^2(x+3) - 16(x+3) = 0$
$(x+3)(x^2-16) = 0$
$(x+3)(x-4)(x+4) = 0$
$\boxed{x=-3 \quad x=4 \quad x=-4}$

9. $\dfrac{x^2-2x-3}{x^4-10x^2+9} = \dfrac{(x-3)(x+1)}{(x^2-9)(x^2-1)}$
$= \dfrac{(x-3)(x+1)}{(x-3)(x+3)(x-1)(x+1)}$
$= \boxed{\dfrac{1}{(x+3)(x-1)}}$

10. $\dfrac{x^3-64}{x^4-2x^3-8x^2} \div \dfrac{x^3+4x^2}{x^2+6x+8}$
$= \dfrac{(x-4)(x^2+4x+16)}{x^2(x^2-2x-8)} \cdot \dfrac{(x+2)(x+4)}{x^2(x+4)}$
$\dfrac{}{x^2(x-4)(x+2)}$
$= \boxed{\dfrac{x^2+4x+16}{x^4}}$

11. $\dfrac{x}{(x-3)(x+3)} - \dfrac{3}{5(x-3)} \quad LCD = 5(x-3)(x+3)$
$= \dfrac{x}{(x-3)(x+3)}\cdot\dfrac{5}{5} - \dfrac{3}{5(x-3)}\cdot\dfrac{(x+3)}{(x+3)}$
$= \dfrac{5x-3x-9}{5(x-3)(x+3)} = \boxed{\dfrac{2x-9}{5(x-3)(x+3)}}$

12. $\dfrac{x+6}{(x+4)(x-3)}\dfrac{(x-3)}{(x-3)} + \dfrac{5}{(x-3)^2}\dfrac{(x+4)}{(x+4)}$
$= \dfrac{x^2+3x-18+5x+20}{(x+4)(x-3)^2}$
$= \boxed{\dfrac{x^2+8x+2}{(x+4)(x-3)^2}}$

13. $\dfrac{x}{(x-3)(x+2)} + \dfrac{3}{(x-3)(x-2)} = -\dfrac{2}{(x-2)(x+2)}$
$(x-3)(x-2)(x+2) \quad (x-3)(x-2)(x+2) \quad (x-3)(x-2)(x+2)$
$x^2-2x + 3x+6 = -2x+6$
$x^2+3x = 0$
$x(x+3) = 0$
$\boxed{x=0 \quad x=-3}$

No extra charge: $x \neq 3, 2, -2$.

14. $y = \dfrac{kx}{z^2}$
$18 = \dfrac{12k}{4}$
$72 = 12k$
$\boxed{k=6}$
$y = \dfrac{6\cdot9}{16}$
$= \boxed{\dfrac{27}{8}}$

15. $\dfrac{xy\left(\frac{4}{x} - \frac{6}{y}\right)}{xy\left(\frac{8}{x} + \frac{2}{y}\right)} = \dfrac{4y-6x}{8y+2x}$
$= \dfrac{2(2y-3x)}{2(4y+x)}$
$= \boxed{\dfrac{2y-3x}{4y+x}}$

16. $\left(\frac{1}{x} - \frac{1}{x+2}\right) \div \left(\frac{1}{x} + \frac{x-2}{x}\right)$
$= \dfrac{x+2-x}{x(x+2)} \div \dfrac{x-2+x}{x(x-2)}$
$= \dfrac{2}{x(x+2)} \cdot \dfrac{x(x-2)}{2x-2}$
$= \boxed{\dfrac{(x-2)}{(x+2)(x-1)}}$

17. $\dfrac{x^{-1}-y^{-1}}{x^{-2}-y^{-2}}$
$= \dfrac{\frac{1}{x}-\frac{1}{y}}{\frac{1}{x^2}-\frac{1}{y^2}}$
$= \left(\frac{1}{x}-\frac{1}{y}\right) \div \left(\frac{1}{x^2}-\frac{1}{y^2}\right)$
$= \dfrac{y-x}{xy} \div \dfrac{y^2-x^2}{x^2y^2}$
$= \dfrac{y-x}{xy} \cdot \dfrac{x^2y^2}{(y-x)(y+x)}$
$= \boxed{\dfrac{xy}{y+x}}$

18. $\left(x^{-2} - y^{-2}\right)^{-1}$
$= \left(\dfrac{1}{x^2} - \dfrac{1}{y^2}\right)^{-1}$
$= \left(\dfrac{y^2-x^2}{x^2y^2}\right)^{-1}$
$= \boxed{\dfrac{x^2y^2}{y^2-x^2}}$

19. $A = \dfrac{2xy}{4+x}$
$4A + Ax = 2xy$
$4A = 2xy - Ax$
$\dfrac{4A}{2y-A} = \dfrac{x(2y-A)}{2y-A} \quad \boxed{x = \dfrac{4A}{2y-A}}$

20. $\dfrac{x^3+3x^2-10x-4}{x+2}$

$\begin{array}{r|rrrr} -2 & 1 & 3 & -10 & -4 \\ & & -2 & -2 & 24 \\ \hline & 1 & 1 & -12 & 20 \end{array}$

$\boxed{x^2+x-12 + \dfrac{20}{x+2}}$