Algebra practice Name

Directions:
Show all work on a separate piece of paper. Place your final answer on this sheet.

1. Given $g(x) = \dfrac{3}{x-1}$

a. Evaluate and simplify completely

i) $g(-2) = -1$ ii) $g(0) = -3$ iii) $g(1) =$ Undefined iv) $g(4) = 1$ v) $g(x+3) = \dfrac{3}{x+2}$

b. Solve algebraically for exact x

i) $g(x) = 5$, $x = \dfrac{8}{5}$ ii) $g(x+2) = 4$, $x = -\dfrac{1}{4}$ iii) $g(x)+2 = 4$, $x = \dfrac{5}{2}$

2. Simply the difference quotient for the following functions [different quotient $\dfrac{f(x+h)-f(x)}{h}$]

a) $f(x) = x^2 + 2x + 3$ $\dfrac{f(x+h)-f(x)}{h} = 2x+2+h$

b) $f(x) = x^3 - 5$ $\dfrac{f(x+h)-f(x)}{h} = 3x^2+3xh+h^2$

c) $f(x) = \dfrac{4}{x}$ $\dfrac{f(x+h)-f(x)}{h} = \dfrac{-4}{x(x+h)}$

3. Simplify the following completely with a common denominator. Your final answer will not contain any negative exponents.

a) $\dfrac{4x}{x-1} - \dfrac{5x+2}{2x} = \dfrac{3x^2+3x+2}{2x(x-1)}$

b) $\dfrac{(b+2)^x}{(b+2)^{4x-2}} = \dfrac{(b+2)^2}{(b+2)^{3x}}$

c) $\dfrac{1+2t}{\sqrt{t+3}} + 2\sqrt{t+3} = \dfrac{7+4t}{(t+3)^{1/2}}$

d) $\dfrac{(x^2+1)\frac{1}{2\sqrt{x}} - \sqrt{x}(2x)}{(x^2+1)^2} = \dfrac{-3x^2+1}{2\sqrt{x}(x^2+1)}$

e) $\dfrac{2}{x+5} - \dfrac{3}{x-5} = \dfrac{-x-25}{(x+5)(x-5)}$

f) $\dfrac{4(z+2)^{1/2} - 2z(z+2)^{-1/2}}{z+2} = \dfrac{2z+8}{(z+2)^{3/2}}$

g) $\dfrac{a^n 3^{n+1}}{3^n a^{n+1}} = \dfrac{3}{a}$

h) $e^x e^{1-x} = e^1 = e$

i) $\dfrac{(x^3+1)^2 - 6x^3(x^3+1)}{(x^3+1)^4} = \dfrac{-5x^3+1}{(x^3+1)^3}$

j) $\dfrac{5}{\sqrt{1-z^2}} - 3\sqrt{1-z^2} = \dfrac{2+3z^2}{\sqrt{1-z^2}}$

k) $\dfrac{2x\cdot(x^2+5)^{1/2} - x^2(x^2+5)^{-1/2}\cdot 2x}{x^2+5} = \dfrac{10x}{(x^2+5)^{3/2}}$

l) $\dfrac{\dfrac{1}{(x+h)^2}-\dfrac{1}{x^2}}{h} = \dfrac{-2x-h}{x^2(x+h)^2}$

m) $\dfrac{\dfrac{1}{x}-\dfrac{1}{y}}{\dfrac{1}{x^2}-\dfrac{1}{y^2}} = \dfrac{xy}{x+y}$

n) $\dfrac{3}{\dfrac{3}{x-1}-1} = \dfrac{3}{(4-x)(x-1)}$

4. Solve algebraically for the exact solution(s). Solve for the indicated variable. Assume all other variables are constants.

$x = \dfrac{\ln(1/2)}{5}$ $\quad e^{5x} + e^{5x} = 1$

$x = 25$ $\quad \log(x) + \log(x-21) = 2$

$y = (-6)^{1/3}$ $\quad 6y^{-2} + y = 0$

$p = 1, 11, -11$ $\quad \dfrac{(p-1)(p^2-11)}{(p-2)(p+3)} = 0$

Technically x no solution. $x = t = 1/3$ $\quad \ln(t+2) - \ln(t) = \ln(7)$

$y = \dfrac{6+x^3}{x^2-4}$ $\quad x^2y - x^3 = 2(2y+3)$

$x = \dfrac{4a-3}{7a-2}$ $\quad 3(ax+1) - 2x = 4(a-ax)$

$x = -6 \text{ or } 2$ $\quad (x+1)(x+3) = 15$

$x = 10/9$ $\quad \log(x) - \log(x-1) = 1$

$x = 2 \text{ or } -5/3$ $\quad \dfrac{3x}{5} - \dfrac{2}{x} = \dfrac{1}{5}$

$x = \dfrac{-5+\sqrt{409}}{2}$ $\quad \log(x+4) = 2 - \log(x+1)$

$x = -1 \pm \dfrac{\sqrt{5}}{2}$ $\quad 4(x+1)^2 - 5 = 0$

$z = 6 \text{ or } -6 \text{ or } -3/2$ $\quad 0 = 4z^3 + 6z^2 - 24z - 36$

$t = 5 \text{ or } -4$ $\quad t^2 - t - 6 = 14$

$x = \dfrac{1+8b}{4b-a}$ $\quad \dfrac{1+ax}{x-2} = 4b$

$x = \dfrac{2a+b}{2}$ $\quad \dfrac{a}{x} + \dfrac{b}{2x} = 1$

$t = 0 \text{ or } -5$ $\quad 10te^{3t} + 2t^2e^{3t} = 0$

$t = \dfrac{\ln(12)}{\ln\left(\frac{3}{.8}\right)}$ $\quad 3^t = 12(.8)^t$

$x = 145$ $\quad \sqrt{x-1} - 10 = 2$

$x = 3 + (13)^{1/3}$ $\quad (3-x)^3 = -13$

$x = 0 \text{ or } 3$ $\quad 9xe^{ax} - 3x^2e^{ax} = 0$

$x = e^e$ $\quad \ln(\ln(x)) = 1$

$x = \dfrac{\ln\left(\frac{A}{B}\right)}{\ln(b/.83)}$ $\quad A(.83)^x = B(b)^x$

$x = 5 \text{ or } -3$ $\quad (x-4)(x+2) = 7$

$x = 3/4$ $\quad 4xe^x - 3e^x = 0$

$y = 2/5$ $\quad \dfrac{5y-2}{y-2} = 0$

$y = \text{No solution}$ $\quad \dfrac{1-4y}{1+2y} + 2 = 0$

$t = -\dfrac{7}{3}$ $\quad 2t - (3t+4) = 5(t+2)$

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

$y = \dfrac{-C-Ax}{B}$ $\quad Ax + By + C = 0$

$t = 2 \text{ or } -2$ $\quad t^3 - 16t^{-1} = 0$

$t = \dfrac{2}{\pi - 1}$ $\quad \ln(t+2) - \ln(t) = \ln(\pi)$

$p = -1 \text{ or } 2/3$ $\quad \dfrac{3p^2+p-2}{p-7} = 0$

$R = \dfrac{ab}{b+a}$ $\quad \dfrac{1}{R} = \dfrac{1}{a} + \dfrac{1}{b}$

5. Determine if each statement is **C**orrect or **I**ncorrect. Circle the correct answer.

C I $\sqrt{x^2+121} = x+11$

C I $\sqrt{4} = \pm 2$

C I $\dfrac{\frac{x+3}{3}}{3} = \dfrac{x+3}{9}$

C I $\dfrac{\frac{w+1}{2}}{w+1} = \dfrac{1}{2}$ for $w \neq -1$

C I $\ln\left(e^x e^y\right) = x + y$

C I $e^{\ln(x)+5} = xe^5$

C I $\ln(M) - \ln(B) = \dfrac{\ln(M)}{\ln(B)}$

C I $\ln\left(\sqrt{a}\right) = \dfrac{1}{2}\ln(a)$

C I $2^{x+y} = 2^x + 2^y$

C I $\log\left(ab^t\right) = t\log(ab)$

C I $\ln\left(e^x + e^y\right) = x + y$

C I $\sqrt[3]{r^3 - 64} = r - 4$

C I $\dfrac{x^{-1}+2}{x} = \dfrac{2}{x^2}$

C I $\dfrac{x^2+3x+1}{x^2} = 3x+1$

C I $e^{-3^2} = e^9$

C I $8(2t+1)^3 = (4t+2)^3$

C I $\left(e^x\right)^2 = e^{2x}$

C I $\dfrac{1}{x-4} = \dfrac{-1}{4-x}$

C I $(x+1)^2 + 2(x+1) = (x+1)(x+3)$

C I $\dfrac{1}{3t^4} = (3t)^{-4}$

C I $\ln(1) = e$

C I $\dfrac{1}{\sqrt[3]{(z-8)^2}} = (z-8)^{-2/3}$

C I $\dfrac{1}{a^{-1}+b^{-1}} = \dfrac{ab}{a+b}$

C I $2^t = t\ln(2)$

C I $\dfrac{1}{x+2} = \dfrac{1}{x} + \dfrac{1}{2}$

C I $\dfrac{\log(x)}{\log(t)} = \dfrac{\ln(x)}{\ln(t)}$

C I $\dfrac{Ax^2+B}{x} = Ax + B$

C I $\log(x+y) = \log(x)\log(y)$

C I $e^{4\ln(x)} = 4x$

C I $(1+y)^3 = 1 + y^3$

C I If $f(x) = 5^x$, then $f(x+4) = 5^x + 4$