Name: Key Period: _____ Score: _____/45pts

PC-4 GROUP TEST/QUIZ

This group test is an opportunity to work collaboratively with other students on some of the material that is covered on the individual test. The format will not be the same in terms of the order of the questions. Your review, group test, daily quizzes, class work, and homework will all help you prepare for the individual assessment. **Show Work!**

1. Solve for x. Show all work. [6 pts]

$$ln(2) + ln(3x+4) - ln(2x+1) = ln(5)$$

$\ln\left(\frac{2(3x+4)}{2x+1}\right) = \ln(5)$

$\frac{6x+8}{2x+1} = 5$

$6x+8 = 10x+5$

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

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

2. Solve for x. Show all work. [6 pts]

$$4^{x+2} = 6^{3x}$$

$\log 4^{x+2} = \log 6^{3x}$

$(x+2)\log 4 = 3x \log 6$

$x\log 4 + 2\log 4 = 3x \log 6$

$x\log 4 - 3x\log 6 = -2\log 4$

$x(\log 4 - 3\log 6) = -2\log 4$

$x = \frac{-2\log 4}{\log 4 - 3\log 6}$

3. Solve for x. Show all work. [6 pts]

$$log_2(x-4) + log_2(x+4) = 3$$

$\log_2(x^2-16) = 3$

$2^3 = x^2 - 16$

$8 = x^2 - 16$

$0 = x^2 - 24$

$24 = x^2$

$\pm\sqrt{24} = x$

$x = 2\sqrt{6}$

$x = -2\sqrt{6}$ Extraneous

4. Gwen decided to save up some money and put it into an account with an annual percentage rate of 2.3%. If the account compounds interest quarterly, how long until Gwen doubles her money? Show all work. [6 pts]

$2P = P\left(1 + \frac{0.023}{4}\right)^{4t}$

$2 = (1.00575)^{4t}$

$\log_{1.00575} 2 = 4t$

$\frac{\log 2}{\log 1.00575} = 4t$

$\frac{120.8936}{4} = \frac{4t}{4}$

$30.2234 = t$

In about 30 years

5. Find the domain of the function. [6 pts]

$$y = \ln(12x - 9)$$

$12x - 9 > 0$

$\frac{12x}{12} > \frac{9}{12}$

$x > \frac{3}{4}$

$D: \{x \mid x > 3/4\}$

6. Fruit flies are place in a half-pint milk bottle with a banana (for food) and yeast plants (for food and to provide a stimulus to lay eggs). Suppose the fruit fly population after t days is given by

$$P(t) = \frac{50}{1 + 16.5e^{-0.47t}}$$

a) What is the carrying capacity of the half-pint bottle? [2 pts] 50

b) How many fruit flies were initially placed in the half-pint bottle? [2 pts]

2.857 About 2 or 3 flies

c) When will the population of fruit flies be 40? [2 pts]

8.914

In 8.914 days

7. Uninhibited Decay: $A = A_0e^{kt}$, $k < 0$

The half-life of radioactive cobalt is 5.27 years. If 100 grams of radioactive cobalt is present now, how much will be present in 20 years? [4 pts]

$\frac{0.5A_0}{A_0} = \frac{A_0e^{k(5.27)}}{A_0}$

$0.5 = e^{k(5.27)}$

$\frac{\ln(0.5)}{5.27} = \frac{k(5.27)}{5.27}$

$k = -0.1315$

$A = 100e^{-0.1315(20)}$

$= 7.2078$

About 7.2078 grams

How long until 35 grams remain? [3 pts]

$35 = 100e^{-0.1315t}$

$0.35 = e^{-0.1315t}$

$\ln(0.35) = -0.1315t$

$t = 7.9834$

In about 7.9834 years

8. Let $f(x) = \frac{-13x-22}{5x+17}$. Find the inverse.

$x = \frac{-13y-22}{5y+17}$

$(5y+17)x = -13y - 22$

$5xy + 17x = -13y - 22$

$5xy + 13y = -22 - 17x$

$y(5x+13) = -22 - 17x$

$y = \frac{-22-17x}{5x+13}$

$f^{-1}(x) = \frac{-22-17x}{5x+13}$

9. Verify the inverse of $f(x) = \frac{-13x-22}{5x+17}$ by showing that $f(f^{-1}(x)) = x$

$\frac{-13\left(\frac{-22-17x}{5x+13}\right) - 22}{5\left(\frac{-22-17x}{5x+13}\right) + 17} = \frac{\frac{286+221x}{5x+13} - 22}{\frac{-110-85x}{5x+13} + 17}$

$= \frac{\frac{286+221x}{5x+13} - \left(\frac{22(5x+13)}{5x+13}\right)}{\frac{-110-85x}{5x+13} + \left(\frac{17(5x+13)}{5x+13}\right)} = \frac{\frac{286+221x}{5x+13} - \left(\frac{110x+286}{5x+13}\right)}{\frac{-110-85x}{5x+13} + \left(\frac{85x+221}{5x+13}\right)}$

$= \frac{286+221x-110x-286}{\frac{-110-85x+85x+221}{5x+13}} = \frac{\frac{111x}{5x+13}}{\frac{111}{5x+13}}$

$= \frac{111x}{5x+13} \cdot \frac{5x+13}{111} = \frac{111x}{111} = x$

10. Complete the table below:

x	-4	-1	3	5	10
$f(x)$	10	5	1	-4	-1
$f^{-1}(x)$	5	10	Undefined	-1	-4
$3f(x)$	30	15	3	-12	-3