CJ.

Name: Key
Recitation Instructor, Day, Time:

TRADITIONAL MATH 100 – Exam 3 – April 2017

Directions: You will find 15 problems listed below. No notes/books/friends are allowed. Graphing calculator models above the level of a TI-84 plus are not allowed. You have one hour to complete this exam.

Page 1 20 pts.	Page 2 20 pts.	Page 3 20 pts.	Page 4 20 pts.	Page 5 20 pts	TOTAL 100 pts

1. (7 points) Find $f^{-1}(x)$ when $f(x) = 2x + 9$.

$y = 2x + 9$

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

$f^{-1}(x) = \frac{x-9}{2}$

2. (7 points) Given $g(x) = x^2 - 7x$ and $h(x) = 2x + 5$, find $g(h(x))$.

$g(h(x)) = g(2x+5) = (2x+5)^2 - 7(2x+5)$

$= 4x^2 + 20x + 25 - 14x - 35$

$= 4x^2 + 6x - 10$

3. (6 points) Expand completely using properties of logarithms (you may assume all variables to be positive): $\log\left(\frac{100x\sqrt{y}}{5}\right)$

$\log(100) + \log(x) + \log(y)^{1/2} - \log(5)$

$= 2 + \log(x) + \frac{1}{2}\log(y) - \log(5)$

Horace

4. (8 points) Solve the following rational equation: $\frac{2x+14}{2x+11} = \frac{x+1}{x+4}$

$$\frac{(2x+14)(x+4) - (x+1)(2x+11)}{(2x+11)(x+4)} = 0$$

$$\frac{[2x^2+22x+56] - [2x^2+13x+11]}{(2x+11)(x+4)} = 0$$

$x = -5$

$$\frac{9x+45}{(2x+11)(x+4)} = 0 \quad ; \quad \frac{9(x+5)}{(2x+11)(x+4)} = 0 \;;$$

5. (6 points) Solve and check: $3x - 2 = \sqrt{18x-5}$

$9x^2 - 12x + 4 = 18x - 5$

$9x^2 - 30x + 9 = 0$

$(3x-9)(3x-1) = 0$

$x = 3$ or $x = \frac{1}{3}$

$7 = \sqrt{49}$ ✓

$1 - 2 \neq \sqrt{6-5}$

Only $x = 3$ works

6. (6 points) Simplify i^{419}.

$$i^{419} = i^{4(104)+3}$$

$$= i^{4(104)} \cdot i^3$$

$$= (1)(-i)$$

$$= -i$$

$$4 \overline{)419} \quad 104$$
$$-4$$
$$19$$
$$-16$$
$$3$$

Bret

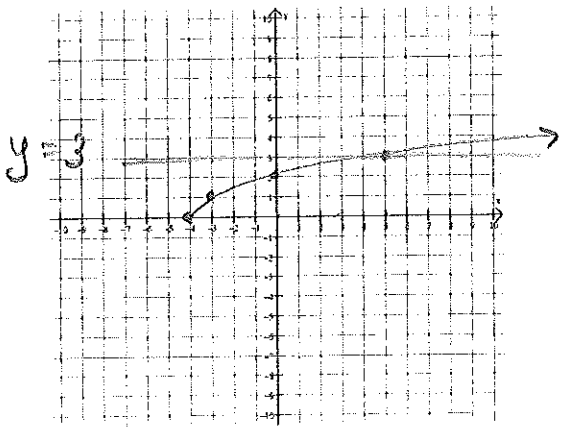
7. (6 points) Condense into a single logarithmic expression using the properties of logarithms (you may assume that x is positive): $\ln(x) - \frac{1}{8}$

$\ln(x) - \frac{1}{8}\ln(e)$

$= \ln(x) - \ln(e^{1/8})$

$= \boxed{\ln\left(\frac{x}{e^{1/8}}\right)}$

8. (5 points) Graph the function $f(x) = \sqrt{x+4}$ on the graph below, include at least 4 points on this graph.Then, using your graph, solve the inquality $\sqrt{x+4} < 3$.



Solution to $\sqrt{x+4} < 3$:

$\boxed{-4 \leq x < 5}$

9. (9 points) Fill in the blank:

(a) $\log_5\left(\frac{1}{125}\right) =$ -3

(b) $\log_3(243) =$ 5

(c) $\log_B(\sqrt{B}) =$ $1/2$

Nemali

10. (8 points) Given that $x = -6$ is one zero of $p(x) = x^3 + 8x^2 + 17x + 30$, find all the other zeros, real or complex, of $p(x)$.

$$\begin{array}{r|cccc} -6 & 1 & 8 & 17 & 30 \\ & \downarrow & -6 & -12 & -30 \\ \hline & 1 & 2 & 5 & 0 \end{array}$$

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

$$x = \frac{-2 \pm \sqrt{4 - 4(1)(5)}}{2(1)} = \frac{-2 \pm \sqrt{-16}}{2} = \frac{-2 \pm 4i}{2}$$

$= \boxed{-1 \pm 2i}$

11. (6 points) Find a 3rd degree polynomial with zeros at $x = 2, x = -1$ and $x = 3$, that also passes through the point $(1, -1)$.

$p(x) = k(x-2)(x+1)(x-3)$

$-1 = k(1-2)(1+1)(1-3)$

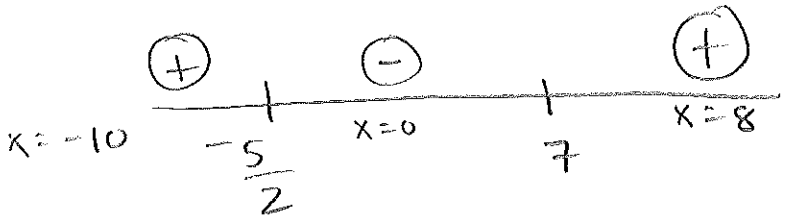
$-1 = k(-1)(2)(-2)$

$-1 = k(4)$

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

$\boxed{p(x) = -\frac{1}{4}(x-2)(x+1)(x-3)}$

12. (6 points) Solve the rational inequality $\frac{2x+5}{x-7} \geq 0$, remembering to check endpoints.



$x = 7$, pole

$x = -\frac{5}{2}$ (zero)

$\boxed{\text{Solution: } (-\infty, -\frac{5}{2}] \cup (7, \infty)}$

Prcm

13. (6 points) Simplify and write in standard $a + bi$ form: $(5 + 3i)(2 - 7i)$

$10 - 35i + 6i - 21i^2$

$= \boxed{31 - 29i}$

14. (6 points) Find the domain of the function $f(x) = \log(-2x + 14)$.

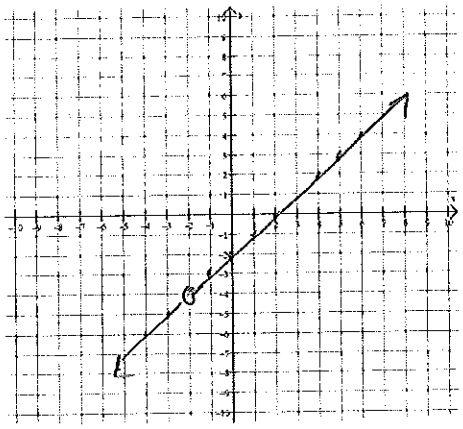
$-2x + 14 > 0$

$-2x > -14$

$\boxed{x < 7}$

15. (8 points) Graph the rational function $r(x) = \dfrac{x^2 - 4}{x + 2}$. Hint: You had homework problems similar to this question.

$r(x) = x - 2, \; x \neq -2$



hole @ $(-2, -4)$.