MATH 25 PRACTICE MIDTERM 1 October 1, 2015

Name: KEY Score: _____ / 100

Student ID: _____

DO NOT OPEN THE EXAM UNTIL YOU ARE TOLD TO DO SO

	1	2	3	4	5	6	Total
✓							
Score							

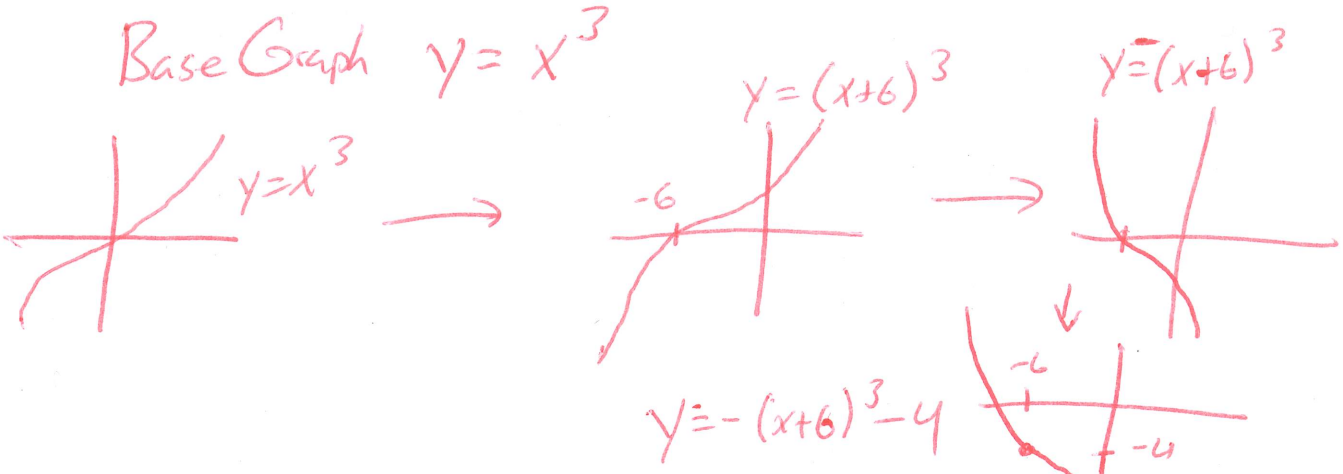
INSTRUCTIONS FOR STUDENTS

- Questions are on both sides of the paper. This is an 5 question exam (One extra credit problem can be attempted for a total of 6 questions).
- Students have 50 minutes to complete the exam.
- **PLEASE SHOW ALL WORK**. Any unjustified claims will receive no credit. Clearly box your final answer.
- You **MUST** complete **5** problems for credit. In the above table in the row with the ✓, please mark with a ✓ which problems you want to be graded. If you wish to do a 6^{th} problem for extra credit, please write *EC* in the ✓ row for the problem you wish to be counted for extra credit.
- No notes, textbooks, phones, calculators, etc. are allowed for the exam.
- Each of the 5 questions you choose to do will be graded out of 4 points. The score will then be totaled and multiplied by 5 to get a raw score out of 100 points. If you choose to do a 6^{th} problem for extra credit, the most that will be awarded for that question will be 3 points. So, the highest possible score on this examination is 103 points out of 100.
- The back of the test can be used for scratch work.

GOOD LUCK!

1) Use graph transformations to sketch the graph of $f(x) = -(x+6)^3 - 4$.

Base Graph $y = x^3$



2) Use polynomial or synthetic division to divide the polynomials: $(-x^3 + 2x - 21) \div (x - 3)$

$$\begin{array}{r} -x^2-3x-7 \\ x-3\overline{)\,-x^3+2x-21} \\ -(-x^3+3x^2) \\ \hline -3x^2+2x-21 \\ -(-3x^2+9x) \\ \hline -7x-21 \\ -(-7x+21) \\ \hline -42 \end{array}$$

$$\begin{array}{r|rrrr} 3 & -1 & 0 & 2 & -21 \\ & \downarrow & -3 & -9 & -21 \\ \hline & -1 & -3 & -7 & -42 \end{array}$$

$$= -x^2 - 3x - 7x + \frac{-42}{x-3}$$

3) Identify the asymptotes of the function: $f(x) = \frac{2x+1}{x^2-2x-15}$

$$f(x) = \frac{2x+1}{x^2-2x-15} = \frac{2x+1}{(x-5)(x+3)}$$

VA's @ $(x-5)(x+3) = 0$

$x = 5 \quad x = -3$ VA's

Degree of denominator > Degree of numerator

$\Rightarrow$ HA @ $y = 0$ (x-axis)

4) Find the difference quotient $\frac{f(x+h)-f(x)}{h}$ for the function $f(x) = x^2 - 5x + 3$, and reduce completely.

$f(x+h) = (x+h)^2 - 5(x+h) + 3$

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

$$= \frac{x^2 + 2xh + h^2 - 5x - 5h + 3 - x^2 + 5x - 3}{h}$$

$$= \frac{h(2x + h - 5)}{h} = \boxed{2x + h - 5}$$

5) Write the inverse function, $f^{-1}(x)$, for $f(x) = x^2 + 9$, and check that your result is the inverse.

$y = x^2 + 9$

$x = y^2 + 9$

$\Rightarrow x - 9 = y^2$

$y = \pm\sqrt{x-9}$

$\boxed{f^{-1}(x) = \sqrt{x-9}}$

Domain $f(x) = (-\infty, \infty)$? No $(0, \infty)$ 1-1

Range $f(x) = (9, \infty)$

Domain $f^{-1}(x) = (9, \infty)$

Range $f^{-1}(x) = (0, \infty)$

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

$= x - 9 + 9$

$= x$

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

6) Solve the following equation for x: $\log(x^2 + 6x) = \log(7)$

$\log(x^2+6x) = \log(7)$

10 10

$x^2 + 6x = 7$

$x^2 + 6x - 7 = 0$

$(x+7)(x-1) = 0$

$\boxed{x = -7 \quad x = 1}$ both work

THIS PAGE IS LEFT BLANK FOR ANY SCRATCH WORK

END OF TEST