Test 2
Dusty Wilson
Math 111 – Fall 2009

Name: ________________________________

Seeing there is nothing that is so troublesome to mathematical practice, nor that doth more molest and hinder calculators, than the multiplications, divisions, square and cubical extractions of great numbers ... I began therefore to consider in my mind by what certain and ready art I might remove those hindrances.

John Napier (1550 - 1617)
Scottish mathematician

No work = no credit

Closed Book & Closed Notes

Warm-ups (1 pt each) $-4^2 =$ ________ $3^0 =$ ________ $\frac{5}{0} =$ ________

1.) (1 pt) The quote by Napier (see above) explains why he invented the logarithm. Why was the logarithm invented? Answer using complete sentences.

2.) (2 pts) A radioactive isotope is said to decay over time. That is, after t years, the original amount of an isotope, N_0 grams, decays until the amount is N grams, where N is defined as $N = N_0\left(\frac{1}{2}\right)^{\frac{t}{200}}$. How much of this isotope, in terms of N_0, remains at time $t = 600$?

Solution: ______________________________

3.) (2 pts) Solve the exponential equation $3^{2x+1} = 27$ for x.

Solution: ______________________________

4.) (2 pts) Use properties of logarithms to rewrite $\log_b\left(\frac{17x^5}{y^{12}}\right)$ as an expression with three terms and no exponents.

Solution: ______________________________

5.) (2 pts) Suppose that you have a formula to measure the loudness of sounds on a logarithmic scale. You do not know what base to use for your logarithms, but you have determined by experiment that $\log_b 2 = 3.4$ and that $\log_b 3 = 5.4$. Use this information and properties of logarithms to calculate $\log_b 24$.

Solution: ________________________________

6.) (2 pts) Use properties of logs to rewrite $\log 5 - \log 2x + 2\log(x-2)$ as a single logarithm.

Solution: ________________________________

7.) (2 pts) Use a calculator to approximate $\log_{13} 230$ to two decimal places.

Solution: ________________________________

8.) (2 pts) Solve $\log_3(2x-2)-1=\log_3 8$ for x.

Solution: ______________________________

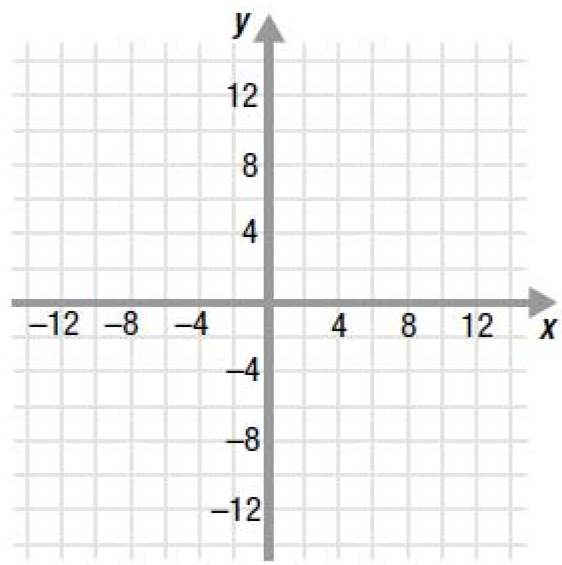
9.) (2 pts) Solve $6^x-5=17$ for x. Round your answer to two decimal places.

Solution: ______________________________

10.) (3 pts) Find the constant term, leading coefficient, and degree of the polynomial function $P(x)=17-5x^2+13x^5-14x^7+8x^6$.

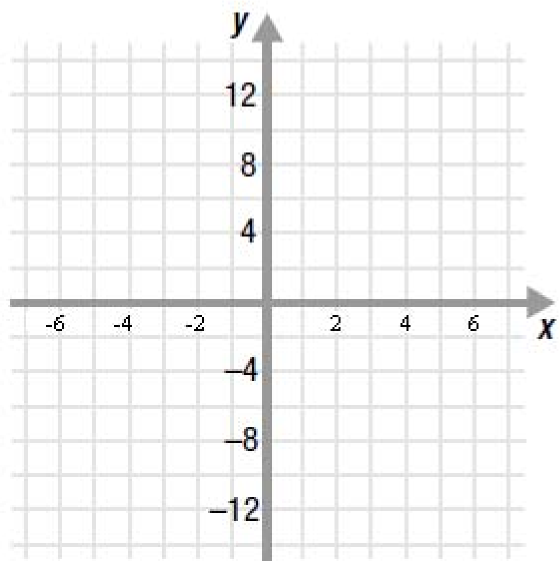
Constant term: _____ Leading coefficient: _____ Degree: _____

11.) (2 pts) Graph the polynomial function $y=P(x)=4x-x^3$ without a graphing calculator (although you can use the calculator to check).



12.) (6 pts) Consider the function $f(x) = \dfrac{6x^2 - 54}{(x-4)(x+2)}$.

a.) What is the domain of f?



b.) Find **all** asymptotes of f.

c.) Sketch a graph of f.

13.) (4 pts) Given the matrices $A = \begin{bmatrix} -5 & 10 & 3 \\ -3 & 1 & -2 \end{bmatrix}$, $B = \begin{bmatrix} -5 & 2 & -4 \\ -1 & 1 & 0 \end{bmatrix}$, and $C = \begin{bmatrix} -4 & 1 & -4 \\ -2 & 1 & 0 \\ 3 & -5 & 2 \end{bmatrix}$,

find the matrix $2A - 3B$ and the matrix $A \cdot C$.

$2A-3B$: ______________________________

$A \cdot C$: ______________________________

14.) (2 pts) Find the infinite sum, S_∞, of this geometric sequence: 81, 27, 9, 3, …

Solution: ______________________________

15.) (4 pts) Use the Gauss-Jordan Method to solve the following system of linear equations:

$$\begin{aligned} x+y+z&=6 \\ 3y-3z&=-18 \\ 2y+z&=3 \end{aligned}$$

Solution: ______________________________

16.) (4 pts) Find the twenty-fourth term, a_{24}, and the sum, S_{24}, of the first 24 terms of the following arithmetic sequence: 3, 7, 11, 15, 19, …

a_{24}: ______________________________

S_{24}: ______________________________

17.) (2 pts) Which expression below represents S_{24}, the sum of the first twenty-four terms of the geometric sequence -2, 8, -32, 128, … **Circle one**

a.) $-2+(24)(-4)$

b.) $\dfrac{-2\left(1-4^{24}\right)}{1-4}$

c.) $\dfrac{-2\left(1-4^{24}\right)}{4-1}$

d.) $\dfrac{-2\left[1-(-4)^{24}\right]}{1-(-4)}$