Practice Final Math 141

Name_____

1.) Simplify the expression and eliminate any negative exponents: $\dfrac{(y^{10}z^{-5})^{1/5}}{(y^{-2}z^{3})^{1/3}}$.

2.) Simplify $\sqrt[3]{\sqrt{64x^{6}}}$.

3.) Simplify $\dfrac{x^{-2}-y^{-2}}{x^{-1}+y^{-1}}$

4.) Solve the following nonlinear inequality algebraically (that is, without using a graphing calculator):

$$x^2 + 5x + 6 > 0$$

5.) Find an equation for the line through (-2, -11) perpendicular to the line passing through (1, 1) and (5, -1).

6.) Find the domain of the function $f(x) = \dfrac{1}{(x+9)^{1/4}}$

7.) Start with $f(x) = \sqrt{x}$; shift 3 units to the left, stretch vertically by a factor of 5, reflect in the x-axis, and write the equation for the final transformed graph.

8.) What is the average rate of change of $\frac{x^3}{x+1} \div \frac{x}{x^2+2x+1}$ between $a = 1$ and $b = 2$? (Hint: simplify first.)

9.) For $f(x) = 2/x$ and $g(x) = x^2 + 1$, find $f - g$ and fg and $f \circ g$.

10.) Does $f(t) = 10000 - 50t - 5t^2$ have a maximum or minimum? (Explain why in words.) For what x-value does it occur?

11.) If $x + y = -24$, what is the largest that the product xy can be?

12.) Find the inverse $f^{-1}(x)$ of the function $f(x) = 1 + \sqrt{1+x}$.

13.) Write the following complex numbers in the form $a + bi$:

a) $(2 + 5i) + (4 - 6i)$

b) $(5 - 3i)(1 + i)$

c) $\dfrac{5 - i}{3 + 4i}$

d) $\sqrt{-2}$

14.) Use synthetic division to find the quotient and remainder of

$$\frac{x^5 + 3x^3 - 6}{x - 1}$$

15.) Find all the real zeros of $P(x) = x^4 - x^3 - 5x^2 + 3x + 6$. (Hint: Start with the smaller positives first.)

16.) Find the intercepts and asymptotes, then use them to sketch a graph of

$$\frac{x^2 - x - 6}{x^2 + 3x}$$

17.) Which of the points P(3, 1) or Q(-1, 3) is closer to the point R(-1, -1)?

18.) Evaluate the following exactly (i.e., without giving a decimal expansion):

a) $\log_8 8^{\sqrt{2}}$

b) $e^{\ln \sqrt{5}}$

b) $\log_4 ½$

19.) Use the Laws of Logarithms to rewrite the following expression with no logarithm of a product, quotient, root, or power:

$$\log_5 \sqrt{\frac{x-1}{x+1}}$$

20.) True or False (circle one):

a) T F A polynomial of degree 20 must have 20 complex zeros, counted with multiplicities.

b) T F $\sqrt{a^2+b^2} = a+b$.

c) T F $\frac{1}{a}+\frac{1}{b}=\frac{1}{a+b}$

d) T F The equation of the circle centered at the origin with radius 2 is $x^2 + y^2 = 4$.

e) T F $f(x) = 6x^3 + 4x^5$ is an odd function.