Fall 2014 Math 130 Final Exam

Show all work to receive full credit. Reduce all fractions. Simplify all Radicals. Rationalize all denominators unless otherwise specified.

1. (2 pts) For $(f \circ g)(x) = \sqrt{x^4 - 25}$, give possibilities for $f(x)$ and $g(x)$. Neither can be x.

$f(x) =$
$g(x) =$

2. (5 pts) Factor the polynomials completely:
   a) $x^3 + 9x^2 - 4x - 36$

   b) $3x^2 + 11x + 10$

3. (6 pts) For the function $y = \dfrac{2x-7}{x+3}$, write the

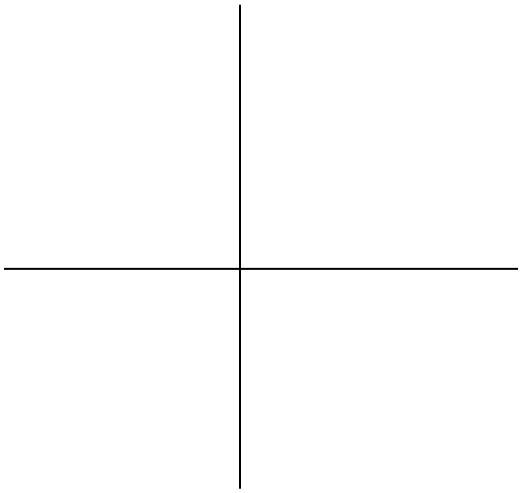
   a) Line that is the Vertical asymptote:

   b) Line that is the Horizontal asymptote:

   c) Point that is the x-intercept:

   d) Point that is the y-intercept:

   e) Graph the function



4. (4 pts) Use the Laws of Logarithms to expand completely: $\ln\left(\dfrac{x(x-1)^3}{\sqrt{6x+7}}\right)$

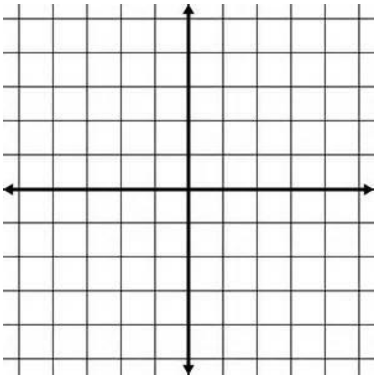
5. (4 pts) Solve the equation $5x^2 - 8x - 7 = 0$

6. (5 pts) Solve the inequality: $\dfrac{x+9}{x-5} \geq 0$ Include your sign chart.

7. (5 pts) Find the equation of the circle in standard form, the center of the circle and the radius for $x^2 - 8x + y^2 + 12y = 5$

8. (4 pts) Find the quotient and remainder using either long division or synthetic division for $\dfrac{x^3 + 2x^2 - 10}{x+3}$ Quotient: Remainder:

9. (4 pts) Sketch the graph of the piecewise defined function: $f(x)=\begin{cases} 3x+5 & if \quad x\le -2 \\ 2-x & if \quad x>-2 \end{cases}$



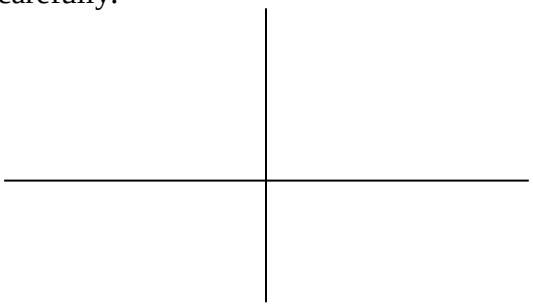
10. (4 pts) Solve the equation: $2e^{x+3}-20=0$

11. (6 pts)Sketch a graph of one complete period for the function $y=3\cos(2(x+\frac{\pi}{2}))$, labeling both the *x*-axis and the *y*-axis carefully.

a) Amplitude:

b) Period:

c) Phase shift:



12. (4 pts) Find the equation of the line in slope-intercept form, that goes through the point (5, 20) and is parallel to the line $y=-4x+19$

13. (4 pts) Simplify completely: $\dfrac{1+\frac{3}{x}}{2-\frac{5}{x}}$

14. (4 pts) From a distance of 600 meters from the base of a tower, the angle of elevation to the top of the tower is 30 degrees. Find the height of the tower. Compute the exact answer.

15. (4 pts) Find the exact value of each:

a) $\cos(0)=$

b) $\ln(1)=$

c) $\sin^{-1}(\frac{\sqrt{2}}{2}) =$

d) $\tan(\cos^{-1}(\frac{1}{2})) =$

16. (5 pts) Simplify the trigonometric expression completely: $\frac{5\tan(x)\sin(x)}{1-\cos^2 x}$

17. (4 pts) Solve the equation $\cos^2(x)+\cos(x)=0$ on the interval $[0,2\pi]$.

18. (4 pts) Solve the equation: $\ln(x+7)=2$

19. (5 pts) Compute the following. You do not need to rationalize denominators. Given an angle θ with terminal side in quadrant 1 and $\sin(\theta)=\frac{1}{6}$,

a) Draw a triangle including θ, labeling the sides.

b) $\cot(\theta) =$

c) $\cos(\frac{1}{2}\theta) =$

d) $\sin(2\theta) =$

20. (4 pts) Find the inverse function for $f(x)=(x-2)^3+7$

21. (5 pts) Form the difference quotient $\frac{f(a+h)-f(a)}{h}$ for the function $f(x)=7x^2-9x+6$

22. (4 pts) Find the domain of $f(x)=\frac{\sqrt{x+8}}{x-5}$ and put your answer in interval notation.

23. (4 pts) Use an Addition or Subtraction Formula to write the expression as a trigonometric function of one number, and then find its exact value.

$\cos(\frac{4\pi}{9})\cos(\frac{7\pi}{18})-\sin(\frac{4\pi}{9})\sin(\frac{7\pi}{18}) =$