MATH 125
SPRING 2014 NAME:
EXAM 3

1. [5 pts. each] Let $h(x) = \dfrac{x^3 + x^2}{x^2 - 4}$.
   (a) Find the domain of h.
   (b) Find the intercepts of h.
   (c) Find all vertical asymptotes of h.
   (d) Find the horizontal or oblique asymptote of h.
   (e) Find all points where h intersects its horizontal or oblique asymptote.
   (f) Sketch the graph of h, finding additional points as needed.

2. [10 pts. each] Solve the inequality. Where applicable, write the solution set in interval notation.
   (a) $x^2 + 5x + 6 > 0$
   (b) $\dfrac{2x+1}{x-5} \leq 3$
   (c) $x^2 + 12 < 4x$

3. [5 pts. each] The compound interest formula is $A(t) = P(1 + r/n)^{nt}$. Suppose that \$750 is invested at 8% interest, compounded quarterly.
   (a) Find the function for the amount to which the investment grows after t years.
   (b) Find the amount of money in the account at time $t = 20$ years.

4. [10 pts.] Express $5\log_2(ab^2) - \log_2(3a^2b) + \log_2(12a^3)$ as a single logarithm, and simplify if possible.

5. [10 pts. each] Solve the equation algebraically.
   (a) $4^{3-2x} = 64$
   (b) $3^x = 6^{x-1}$
   (c) $e^x - 12e^{-x} - 1 = 0$
   (d) $\log_2(10 + 3x) = 5$
   (e) $\log_2(x + 1) + \log_2(x - 1) = 3$

6. [10 pts.] Given that $\cot\varphi = \frac{1}{2}$, find the other five trigonometric function values.

7. [10 pts.] Convert 67.93° to degrees, minutes, and seconds. Round to the nearest second.

8. [10 pts.] To measure the height of a cloud at night, a vertical beam of light is directed at the cloud. From a point on the ground 65 meters away from the light source, the angle of elevation to the illuminated spot on the cloud is determined to be 72.35°. Find the height of the cloud to the nearest meter.