MATH 125
FALL 2015
EXAM 3

NAME:

1. [10 pts.] Find the domain, range, and horizontal asymptote of the function $f(x) = 1 - 2^{x+3}$.

2. [5 pts.] Find the domain of $g(x) = 8 + 5\ln(2x + 3)$.

3. [10 pts. each] Solve each equation exactly (no rounded decimals).
   (a) $5^{x^2+8} = 125^{2x}$
   (b) $\log_3(3x - 2) = 2$
   (c) $5e^{x/5} = 7$
   (d) $\log_5(x + 3) = 1 - \log_5(x - 1)$
   (e) $2^{x+1} = 5^{1-2x}$

4. [10 pts.] Write $2\log_8 u - 3\log_8 v$ as a single logarithm with coefficient 1.

5. [5 pts. each] Iodine-131 is a radioactive isotope that decays according to the function $A(t) = A_0 e^{-0.087t}$, where A_0 is the initial amount present (in grams) and $A(t)$ is the amount present at time t (in days). Assume a scientist has a sample of 100 grams of iodine-131.
   (a) How much iodine-131 is left after one week?
   (b) When will 5 grams of iodine-131 be left?
   (c) What is the half-life of iodine-131?

6. [10 pts.] Convert $29.411°$ to $D°M'S''$ form. Round the answer to the nearest second.

7. [15 pts.] Given that $\cot\theta = \frac{4}{3}$ and $\cos\theta < 0$, find the exact value of each of the remaining trigonometric functions of θ.

8. [5 pts.] Find the domain and range of the function $f(x) = 2 - 4\cos(3x)$.

9. [10 pts.] Find the domain and range of the function $g(x) = \frac{1}{2}\tan\left(\frac{1}{4}x\right) - 5$.

10. [10 pts.] Find the amplitude, period, and phase shift of the function $h(x) = 2\cos(2\pi x + 4) + 7$.