Second Hour Exam

- Write clearly your name, the name of your TA, and the discussion time on the exam booklet.
- Show all work in exam booklet. Clearly label and box answers. If no work then no credit. Nothing written on the exam sheet will be marked.
- Turn in the exam booklet. You can keep the exam sheet.

(25 pts) **1. Logarithmic and exponential equations.**

(a) Use the change-of-base formula to compute
$$\log_{27} \frac{1}{3}.$$
(Hint: change to the base 3.) Leave your answer as a ratio. Show work.

(b) Solve the logarithmic equation
$$\log_5 (2x + 1) - \log_5 25 = 1.$$

(c) Solve the exponential equation
$$9^x - 4 * 3^x + 4 = 0.$$

(25 pts) **2. Graphing a function**. Consider the function $y = \frac{1}{2} \cos 3x$.

(a) Compute the period T of the function. Show work.

(b) Compute the amplitude A of the graph. Show work.

(c) Determine the five 'key' points of the function, and determine the values of the function at these points.

(d) Graph one cycle of the function. Use at least $1/4$ of a page for your graph.

(25 pts) **3. Computing values of trigonometric functions**. You know that $\cos \alpha = 3/5$, and $\sin \alpha < 0$.

(a) Which quadrant the angle α is in?

(b) Using trigonometric identities, compute $\sin \alpha$.

(c) Using trigonometric identities, compute $\tan \alpha$ and $\cot \alpha$.

(d) Compute $\sec \alpha$ and $\csc \alpha$.

(25 pts) **4. Exponential models in finance**. Recall that the future value of a lump sum of money is determined by the formula
$$A = P \left(1 + \frac{r}{n}\right)^{nt},$$
where P is the principal, r is the rate of interest, n is the number of compounding periods within a year, and t is the number of years.

Recall that the effective rate of interest is the equivalent annual simple interest rate that would yield the same amount as compounding n times per year, after one year, and is given by
$$r_e = \left(1 + \frac{r}{n}\right)^{n} - 1.$$

(a) Suppose you invest 1200 dollars at an interest rate of 7% compounded quarterly, for the period of 2 years. What is the value of your investment after 2 years? Show work.

(b) Compute the effective rate of interest for your investment. Show work.

(c) Suppose another bank offers you an opportunity to invest your money at 6.5% compounded daily. Compute the effective rate for your investment. Show work.

(d) Which bank offers a better deal? Explain your answer.