- ALL WORK MUST BE SHOWN in the booklet for full credit.

- Exact solutions are expected for some problems as instructed, there will be no credit for decimals; NO SHARING OF CALCULATORS.

- Place your exam question sheet INSIDE the booklet when you hand in your exam TO YOUR TA.

- Keep your eyes on your own paper, cheating will be dealt with severely.

- Remember to hand in your special assignment 2.

1. Let $f(x) = \dfrac{3}{2x+5}$.

    (a) (5 pts) Find the inverse of $f(x)$.

    (b) (5 pts) Show that $f(f^{-1}(x)) = x$.

    (c) (5 pts) State the domain and the range of f.

2. Solve each equation.(Express the solution in an exact form).

    (a) (10 pts) $5^{x-2} = 3^{2x+1}$ (b) (10 pts) $\log_2 x^4 - \log_4 x = 7$

3. (a) (7 pts)Find the amount that results from investing \$100 at 6% compounded quarterly after a period of 3 years.

    (b) (8 pts) Find the principal (the present value) needed now to get \$300 after 4 years at 8% compounded continuously.

4. A culture of bacteria obeys the law of uninhibited growth.

    (a) (5 pts) If N is the number of bacteria in the culture and t is the time in hours, express N as a function of t.

(b) (10 pts) If 500 bacteria are present initially and there are 800 after 1 hour, how many will be present in the culture after 5 hours? Round your answer to two decimal places.

5. (20 pts) Given $\tan \theta = -\dfrac{12}{5}$, $\sin \theta > 0$. Find the exact value of each of the remaining trigonometric functions of θ.

6. Given $f(x) = 2\sin(\dfrac{\pi}{4}x - \pi)$.

   (a) (5 pts) Find the amplitude, period, and phase shift of $f(x)$.

   (b) (10 pts) Find the five key points of $f(x)$.