Alg2 Classwork/Homework, due Wednesday, February 14 ❤️

On a separate sheet of paper, answer each question, showing as much of your work as possible.

The following formulae for continuous interest might be useful in answering one of the questions.

$$A_t = P \cdot e^{r \cdot t}$$

For Exercises 12 and 13, use $v = -0.0098t + c \ln R$.

12. Space Find the velocity of a spacecraft whose booster rocket has a mass ratio of 20, an exhaust velocity of 2.7 km/s, and a firing time of 30 s. Can the spacecraft achieve a stable orbit 300 km above Earth?

13. A rocket has a mass ratio of 24 and an exhaust velocity of 2.5 km/s. Determine the minimum firing time for a stable orbit 300 km above Earth.

29. Investing An initial deposit of $200 is now worth $331.07. The account earns 8.4% interest, compounded continuously. Determine how long the money has been in the account.

30. An investor sold 100 shares of stock valued at $34.50 per share. The stock was purchased at $7.25 per share two years ago. Find the rate of continuously compounded interest that would be necessary in a banking account for the investor to make the same profit.

39. Space Use the formula for maximum velocity $v = -0.0098t + c \ln R$. Find the mass ratio of a rocket with an exhaust velocity of 3.1 km/s, a firing time of 50 s, and a maximum shuttle velocity of 6.9 km/s.

40. Power The battery power available to run a satellite is given by the formula $P = 50e^{-\frac{t}{250}}$, where P is power in watts and t is time in days. How long can the satellite run if it requires 15 watts? 45 watts?

Biology **For Exercises 44–46, use the formula $H = \left(\frac{1}{r}\right)(\ln P - \ln A)$. H is the number of hours, r is the rate of decline, P is the initial bacteria population, and A is the reduced bacteria population.**

44. A scientist determines that an antibiotic reduces a population of 20,000 bacteria to 5000 in 24 hours. Find the rate of decline caused by the antibiotic.

45. A laboratory assistant tests an antibiotic that causes a rate of decline of 0.14. How long should it take for a population of 8000 bacteria to shrink to 500?

46. A scientist spilled coffee on the lab report shown at the left. Determine the initial population of the bacteria.

Savings **Suppose you invest \$500 at 5% interest compounded continuously. Copy and complete the table to find how long it will take to reach each amount.**

	Amount (A)	Time (years)
47.	\$600	
48.	\$700	
49.	\$800	
50.	\$900	
51.	\$1000	
52.	\$1100	
53.	\$1200	
54.	\$1300	