

Exam 3

Prob.	1	2	3	4	5	6	7	8	9	10	11	
Value	9	10	10	6	10	5	10	10	12	12	6	100
Points												

Show all work for credit. Answers with little or no supporting work will receive little or no credit.

Compound Interest: $A = P(1 + \frac{r}{k})^{kt}$

Continuous-Compounding Model: $A = Pe^{rt}$

Exponential Model: $P(t) = P(0)e^{kt}$

1. Solve for x Algebraically: Show Work!

(a) $3^x = 21$.

(b) $5x^3 = 17$.

(c) $1.03^{2x} = 6.2$.

2. Solve algebraically: $(\frac{1}{2})^{.04t} = .8(\frac{1}{2})^{.032t}$

3. An investment went up 31% two years in a row and down 13% the next year.

- (a) What was the total change over the three years?
- (b) What was the average change over the three years?

4. Find a polynomial $P(x)$ such that $P(-2) = 0$, $P(7) = 0$, $P(3) = 0$, and $P(0) = 4$.

5. Find the roots, holes, vertical asymptotes, horizontal asymptotes, and the End-Behavior Model of $\frac{x(4x^2 + 1)(x + 3)}{(x + 3)(x^2 - 2)}$.

6. Solve for x algebraically in $\sqrt{2x} - \sqrt{x+7} = 1$.

7. (a) You want to buy a shirt that has been marked down 20% to \$17.95. What was the original price?

(b) Box A is 35% smaller than box B. How much bigger is box B than box A?

8. Give the simplest rational function such that it has zeros at $x = 0$, $x = 4$, and $x = 9$, a vertical asymptotes at $x = 3$ and $x = 2$, and an End-Behavior Model of $\frac{x^5}{3}$.

9. You walk outside after another wonderful day of pre-calculus and have a wild-eyed stranger offer to give you \$5,000 if you promise not to make him look like a fool in public. You take the money and think it would be wise to invest it. You have two options. You can invest into a fund that is compounded quarterly at a 3% APR, or into a high-risk gambling ring that will charge you a \$75 setup fee, but it is compounded continuously at 8%. If you plan to invest for 5 years, which is a better deal? Justify your answer.

10. You have an unknown substance that you found in a cave. You had 15 grams when you left the cave. Now, two hours later, you have 21 grams. How long will it take for a given amount of the substance to double? How much will there be after 7 days?

11. Use the properties of logs to rewrite the following expression as an equivalent expression without logs of products, logs of quotients, or logs of powers.

$$\log\left(\frac{x^3(1-x)^5}{4-x}\right)$$