

Math-19 Practice Final

- 1). You have a credit card with 36% annual interest compounded monthly. You use of the card over the next 3 months is summarized below:

MONTH	PURCHASES	PAYMENTS
Opening Balance	\$525	
JUN	\$745	\$500
JUL	\$210	\$600
AUG	\$125	\$150

On September 1, you make an additional \$250 payment.

- Who is the lender?
 - Who is the borrower?
 - Construct a polynomial in $(1 + \frac{r}{n})$ that describes the account activity right after you make the payment on Sep 1.
 - What is the account balance right after the Sep 1 payment?
 - What would be the account balance if you never did anything other than leave the opening balance as is and the account compounds continually?
- 2). Consider the function $f(x) = 1 + e^{-x}$.
- What are the x-intercepts (if any)?
 - What are the y-intercepts (if any)?
 - What is the end behavior as $x \rightarrow \infty$? If it is asymptotic, be sure to state what the asymptote is, whether it is horizontal or vertical, and if the function approaches it from above or below.
 - Repeat for $x \rightarrow -\infty$.
 - Sketch the graph of the function. Be sure to label all intercepts and asymptotes and show the proper end behavior.
 - What is the domain?
 - What is the range?
- 3). Consider the equation $y = \log_a x$.
- What is the corresponding exponential equation?
 - Derive the change of base formula.
 - Use your formula to calculate $\log_2 250$. Round your answer to 4 decimal places.
 - Does it matter if you use \log or \ln when using your calculator when doing a change of base? Why?

- 4). Let $\log_a 100 = 2.36659$, $\log_a 3 = 0.56458$, and $\log_a 150 = 2.57496$. Calculate $\log_a 2$ without knowing the base a .
- 5). Solve for x , leaving your answer as an exact value. Points will be deducted for approximate (decimal) answers!

$$\frac{50}{1 - e^{-x}} = 4$$

- 6). Solve for x , leaving your answer as an exact value. Points will be deducted for approximate (decimal) answers!

$$\log_9(x - 5) - \log_9(x + 3) = 1$$

- 7). The half-life Radium-226 is 1600 years.
- Derive a base-2 equation for the radioactive decay this isotope.
 - Now derive a base-e equation.
 - You start with a 100g sample. How much is left after 100 years?
 - How long does it take the sample to decrease to 75g?
- 8). Let $\tan x = -\frac{7}{24}$ with x in Quadrant IV.
- Find $\sin 2x$.
 - Find $\cos 2x$.
- 9). Rewrite in terms of x and y without trig functions: $\tan(\sin^{-1} \frac{x}{2} + \cos^{-1} \frac{2y}{3})$.

- 10). Find all possible solutions for θ :

$$\sqrt{8} \sin x \cos x + \sqrt{6} \sin x - 2 \cos x - \sqrt{3} = 0$$