Answers on Line

Practice Test

Show all work. Answers without adequate justification will not receive full credit. Solve problems algebraically whenever possible. Simplify to the lowest terms.

Be able to do this w/o a calculator:

1) (9pts) Match the graphs with the equations.

$y = 3^x$ Letter E

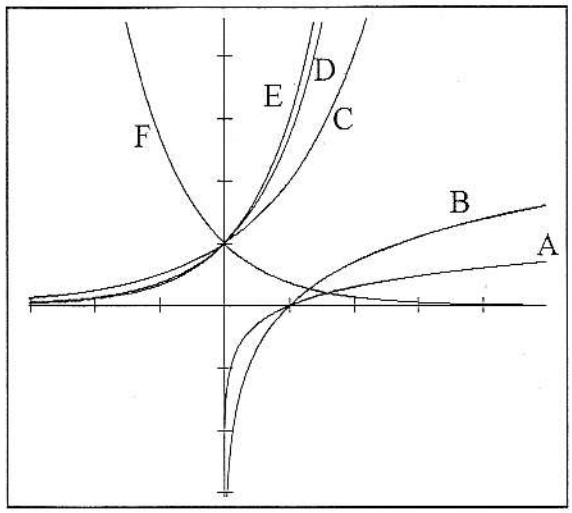
$y = (0.4)^x$ Letter F

$y = e^x$ Letter D

$y = \log x$ Letter A

$y = \ln x$ Letter B

$y = 2^x$ Letter C



----------The rest is a calculator Active exam----------

2) (10pts) Fill in the following table:

Function	y-intercept	Growth or decay?	Growth or decay rate
$22(.92)^x$	(0, 22)	Decay	8% annual rate
$y = 16(1.3)^x$	(0,16)	Growth	30% Annual
$y = 13e^{0.45x}$	(0,13)	growth	45% Continuous
$7e^{.04t}$	(0, 7)	Growth	4% *continuous* rate

3) (8pts) Granny wants to start a college account for her newborn granddaughter. How much money does she need to deposit now into an account earning 3% compounded quarterly so it will be worth \$30,000 in 18 years?

$30000 = P\left(1 + \frac{.03}{4}\right)^{4(18)}$

$30000 = P(1.0075^{72})$

$30000 = P(1.712553)$

\$17,518

4) (8pts) The population, P, of a group of rabbits t years after being released in a new habitat is given by $P(t) = 600(1.04)^t$

a) How many rabbits were initially released? 600

b) Fill in the blank: The rabbit population is growing by 4 % per year

c) How many rabbits will there be in 2 years? 648

d) When there will be 700 rabbits? 3.94 yrs

$600(1.04)^2 =$

$700 = 600(1.04)^T$

$1.167 = 1.04^T$

$\frac{\log 1.167}{\log 1.04}$

5) (15pts) Solve the following for x.

a) $2\log_3(2x-5) = 4$

$\log_3(2x-5) = 2$

$3^2 = 2x-5$

$9+5 = 2x$

$x = 7$

b) $3(4)^{x+2} = 18$

$4^{x+2} = 6$

$x+2 = \frac{\log 6}{\log 4}$

$x = \frac{\log 6}{\log 4} - 2$

$-.708$

c) $4e^{8x} + 3 = 19$

$4e^{8x} = 16$

$e^{8x} = 4$

$8x = \ln 4$

$x = \frac{\ln 4}{8}$

0.173

6) (10pts) Find a formula for an exponential function such that $f(-1) = 12$ and $f(1) = 3$

$12 = ab^{-1}$

$12b = a$

$\frac{12b}{1} = \frac{3}{b}$

$12b^2 = 3$

$b^2 = \frac{1}{4}$ $b = \frac{1}{2}$

$3 = ab^1$

$\frac{3}{b} = a$

$\frac{3}{\frac{1}{2}} = a$

$6 = a$

$y = 6\left(\frac{1}{2}\right)^x$

7) (4pts) Rewrite as a single logarithm: $3\log(x) + 4\log(y) - \log(z)$

$\log x^3 + \log y^4 - \log z$

$\log \frac{x^3 y^4}{z}$

$\log\left(\frac{x^3 y^4}{z}\right)$

8) (8pts) Solve for x. $\log(x + 48) + \log(x) = 2$

$\log x^2 + 48x = 2$

$x^2 + 48x = 100$

$x^2 + 48x - 100 = 0$

$(x + 50)(x - 2) = 0$

-50 $+2$

but $\log(-50 + 48)$

$\log(2)$

$x = 2$

9) (6pts) Bismuth-214 has a half-life of 20 minutes. What percent of the original amount is left after one hour?

$\frac{1}{2} = b^{20}$ $b = .9659$ $y = 100(.9659)^{60}$ 12.5%

10) (10pts) In 2003, there were 7225 Starbucks stores. In 2006, there were 12,440 Starbucks stores. If Starbucks continues to increase exponentially at the same rate find the doubling time.

(0, 7225) $12440 = 7225(b)^3$ 3.84 yrs

(3, 12440) $b = 1.1986$

$2 = 1.1986^T$

$\log_{1.1986}(2) = \frac{\log 2}{\log 1.1986}$

11) (12pts) The Island of Niue is currently home to 5000 people, and the population has been growing continuously by 9 %. The Cook Islands are currently home to 20,000 natives but the native population has been continuously decreasing by 5 % each year.

Write the equation for the population of the Island of Niue. $N(t) =$ $5000e^{.09T}$

Write the equation for the population of the Cook Islands. $C(t) =$ $20000(e)^{-.05T}$

If these trends continue, **during what year** will the populations be the same? 2026

hint: if you can't do this algebraically do it with your calculator for partial credit

$5000e^{.09T} = 20000e^{-.05T}$ $.025 = .8674^T$ $T = 9.9$

$.125 = \left(\frac{e^{-.05}}{e^{.09}}\right)^T$ $\frac{\log .5}{\log .8694}$

Also make sure you know how to write the equation of a transformed log function from a graph along with a transformed exponential function from a graph.