Test Practice Part Duex Answer Key

① $\frac{25{,}321}{56576} = \frac{56576(1-r)^9}{56576}$

$\frac{25321}{56576} = (1-r)^9$

$\sqrt[9]{\frac{25321}{56576}} = 1-r$

$\frac{\sqrt[9]{\frac{25321}{56576}} - 1}{-1} = \frac{-r}{-1}$

$\frac{\sqrt[9]{\frac{25321}{56576}} - 1}{-1} = r = 0.08545.... = \boxed{8.5\%}$

② Find inverse $f(x) = 3(4^{3x-1})$

1st Switch x+y $\frac{x}{3} = \frac{3(4^{3y-1})}{3}$

Isolate exp/log $\frac{x}{3} = 4^{3y-1}$

Solve for y

$\log_4\left(\frac{x}{3}\right) = 3y-1$

$+1 \qquad +1$

$\frac{\log_4\left(\frac{x}{3}\right)+1}{3} = \frac{3y}{3}$

$y = \frac{\log_4\left(\frac{x}{3}\right)+1}{3}$

③ $7^{x+2} = 17$

$x+2 = \log_7(17)$

$-2 \qquad -2$

$x = \log_7(17) - 2 = -.544$

④ $f(x) = 2^x - 7$ and $g(x) = 2^x + 2$ can be written as $f(x)+k$

$f(x)$ to $g(x)$ is a vertical shift of 9

so this would be $f(x)+9$

so $\boxed{k = 9}$

⑤ * 1st We need to Calculate the # of cattle for 2020.
* To do that, find the growth rate

$$\frac{25540}{13000} = \frac{13000(1+r)^6}{13000}$$

$$\sqrt[6]{\frac{25540}{13000}} = 1+r$$

$$\sqrt[6]{\frac{25540}{13000}} - 1 = r$$

$$.1191 = r$$

Now use the "r" to find 2020

$$A = 13000(1+.1191)^{18}$$

$$A = 98{,}533 \text{ cattle}$$

Now calculate 12% bonus

$$98{,}533 \cdot .12 = \$11{,}824$$

Add this to \$75,000

$$75{,}000 + 11{,}824 = \$86{,}824$$

⑥ $8^x = 32^{2x-4}$

rewrite these with the same base (Hint: try to look for a base of 2, 3, 4, or 5
$8 = 2^3$ $32 = 2^5$

$$(2^3)^x = (2^5)^{2x-4}$$

$$2^{3x} = 2^{10x-20}$$

$$3x = 10x - 20$$

$$\frac{-7x}{-7} = \frac{-20}{-7}$$

$$\boxed{x = 20/7}$$

⑦ Find inverse

$$y = 7e^{x-1}$$

$$\frac{x}{7} = \frac{7e^{y-1}}{7}$$

$$\frac{x}{7} = e^{y-1}$$

$$\ln\left(\frac{x}{7}\right) = y-1$$

$$+1 \quad +1$$

$$\boxed{\ln\left(\frac{x}{7}\right)+1 = y}$$

⑧ $g(x) = 4^x$ is parent function which means it starts as $y = 4^x$ and then was shifted

$f(x) = (4^{x+2}) + 5$

+5 means shifted ↑ 5 units
+2 on x means ← 2 units

⑨ continuous compounding $A = Pe^{rt}$

$$\frac{10{,}000}{5{,}000} = \frac{5{,}000e^{.073t}}{5{,}000}$$

now solve remember ln is inverse of "e"

$2 = e^{.073t}$

$$\frac{\ln 2}{.073} = \frac{.073t}{.073}$$

9.5 yrs = t

⑩ Find Inverse

$y = \log_7(x+6) - 2$

$x = \log_7(y+6) - 2$

$+2 \qquad +2$

$x+2 = \log_7(y+6)$

$7^{x+2} = y + 6$

$-6 \qquad -6$

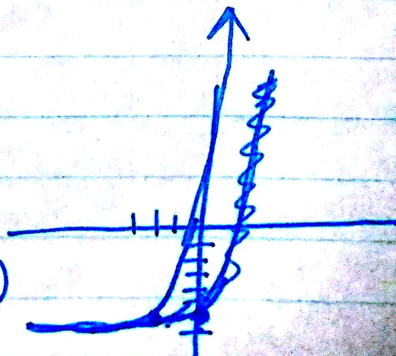
$7^{x+2} - 6 = y$

switch x & y
1st: Isolate log
2nd: turn to exponent
3rd: move 6

⑪ Domain & Range $f(x) = 2^{x+3} - 7$

exponentials always have Domain All real #s or $(-\infty, \infty)$

Range is the add or subtracted # to infinity so:... $(-7, \infty)$ or $y > -7$



Recap: Domain $(-\infty, \infty)$ Range $(-7, \infty)$

⑫ Convert $\log_8 w(z) = 5z+6$ into exponential

$$8^{5z+6} = w(z)$$

⑬ inverse $h(x) = \ln(7x)+1$

$$x = \ln(7y)+1$$

$$-1 \qquad\qquad -1$$

$$x-1 = \ln(7y)$$

$$\frac{e^{x-1}}{7} = \frac{7y}{7}$$

$$\frac{e^{x-1}}{7} = y$$

⑭ $(1+0.067)^t$

this is the annual
for monthly we need
to make it $12t$
but we need to keep it mathematically
the same

$$(1.067)^t = (1.067)^{1t}$$

$$(1.067)^t = (1.067)^{\frac{12}{12}t}$$

$$(1.067)^t = \left(1.067^{\frac{1}{12}}\right)^{12t}$$

$$(1.067)^t = (1.005418877)^{12t}$$

$$(1.067)^t = (1.0054)^{12t}$$

yearly = monthly

$r = .0054 = .54\%$

(15) $A = P\left(1+\frac{r}{n}\right)^{nt}$

$75{,}000 = P\left(1+\frac{.042}{12}\right)^{12(8)}$

$75{,}000 = P(1.398518369)$

$\frac{75{,}000}{1.398518369} = P$

$53{,}628.18 = P$

$A = 75{,}000$
$P = ?$
$r = .042$
$n = 12$
$t = 8$

(16) $\frac{64353}{321765} = \frac{321765\, e^{-1.6t}}{321765}$

$.2 = e^{-1.6t}$

$\frac{\ln(.2)}{-1.6} = \frac{-1.6t}{-1.6}$

$1.005898695 = t$ $\boxed{1 \text{ year}}$ which is 2018

(17) $\frac{5(2)^{4x+3}}{5} = \frac{85}{5}$

$2^{4x+3} = 17$

$4x+3 = \log_2(17)$
$-3 \qquad -3$

$\frac{4x}{4} = \frac{\log_2(17)-3}{4}$

$x = \frac{\log_2(17)-3}{4} = .2718657103 \approx .2719$