

$$1a) y = 1200 \left(1 + \frac{.0494(12)}{12}\right) = \$1459.25$$

$$b) y = 1200 e^{.0494(12)} = \$1459.83$$

$$2) (0, 14) (10, 60) \quad 14 = \frac{200}{1 + ab^0}$$

$$14(1+a) = 200$$

$$1+a = 14.286$$

$$a = 13.286$$

$$60 = \frac{200}{1 + 13.286(b)^{10}}$$

$$60(1 + 13.286b^{10}) = 200$$

$$1 + 13.286b^{10} = \frac{3.33 - 1}{13.286} = (.1756)^{1/10} = .84$$

$$y = \frac{200}{1 + 13.29(.84)^x}$$

$$\frac{200}{1 + 13.29(.84)^{20}} = \boxed{142.19}$$

$$3) y = 325 e^{.03(10)} = 438.70$$

\$113.70 interest

$$4) 23000(1+r) = 31,900$$

$$1+r = 1.387$$

$$r = .387 \rightarrow \boxed{38.7\%}$$

$$5) (0, 10) (19, 371)$$

$$371 = \frac{600}{1 + 59b^{19}}$$

$$10 = \frac{600}{1+a}$$

$$10(1+a) = 600$$

$$a = 59$$

$$538 = \frac{600}{1 + 59(.79)^x}$$

$$371(1 + 59b^{19}) = 600 \quad b = .79$$

$$X = 26.46 \quad \boxed{2011}$$

$$6. \left(1 + \frac{.043}{12}\right)^{12} - 1 = .044 \quad 4.4\%$$

$$\left(1 + \frac{.046}{2}\right)^2 - 1 = .047 \quad 4.7\% \quad \boxed{\text{2nd piggy}}$$

$$7. y = 13,500(1 - .14)^{12} = \boxed{2209 \text{ mice}}$$

$$8. (0, 8) \quad (17, 99) \quad 8 = \frac{500}{1+ra} \quad 8(1+a) = 500$$

$$99 = \frac{500}{1+61.5b^{17}} \quad 99(1+61.5b^{17}) = 500$$

$$b = .85$$

$$350 = \frac{500}{1+(.85)^x} \quad x = 30.56$$

$$\approx \boxed{31 \text{ years}}$$

$$9a) y = 3500(1 - .03)^{24} = 1684.96 \quad \boxed{1684 \text{ mice}}$$

$$b) 3500(.97)^x = 700$$

$$.97^x = .2$$

$$x \log .97 = \log .2$$

$$x = \frac{\log .2}{\log .97} = 52.84 \div 12 = \boxed{4.4 \text{ years}}$$

$$10 \left(1 + \frac{.05}{3}\right)^3 - 1 = .0508 \rightarrow 5.08\%$$

$$11 (5, 33) \quad y = a(1 + .25)^x$$

$$33 = a(1 + .25)^5$$

$$33 = a(3.05)$$

$$a = 10.8 \rightarrow \boxed{10 \text{ Rabbits}}$$

$$12 \text{ a) } 1000e^{.0375(4)} = \$1161.83$$

$$\text{b) } 3000 = 1000e^{.0375t}$$

$$3 = e^{.0375t}$$

$$\ln 3 = \ln e^{.0375t}$$

$$\ln 3 = .0375t$$

$$\frac{\ln 3}{.0375} = \frac{.0375t}{.0375}$$

$$t = 29.296 \rightarrow 29.3 \text{ years}$$

$$13 \text{ a) } y = 20(1.04)^{60} = \boxed{210 \text{ Ants}}$$

$$\text{b) } 20(1.04)^x = 500$$

$$1.04^x = 25$$

$$x \log 1.04 = \log 25$$

$$x = \frac{\log 25}{\log 1.04} = 82 \text{ months}$$

$$\div 12 = 6.8$$

about 7 years

$$14 \quad 1000e^{.08x} = 3000$$

$$e^{.08x} = 3$$

$$\ln e^{.08x} = \ln 3$$

$$x = \frac{\ln 3}{.08} = \boxed{13.73 \text{ years}}$$

$$15 \quad y = a \cdot b^x \quad 36 = 12(b)^4$$

$$3 = b^4$$

$$b = (3)^{1/4}$$

$$y = 12(3^{1/4})^x$$

$$y = 12(3)^{x/4}$$

$$16 \quad \text{H. A } y = 0, y = 18$$

y-intercept (0, 3)

$$\frac{18}{1+5} = \frac{18}{6} = 3$$

$$17 \quad f(x) = 6 \log(-8x+2)$$

logs can't be negative!

$$-8x+2 > 0$$

$$-8x > -2$$

$$x < \frac{1}{4}$$

$$\text{Domain: } (-\infty, \frac{1}{4})$$

$$\text{Range: } (-\infty, \infty)$$

$$18 \quad f(x) = \log_3(x-5) + 1$$

Change of Base

$$\rightarrow \frac{\ln(x-5)}{\ln 3} + 1 = \frac{1}{\ln(3)} \cdot \ln(x-5) + 1$$

$$= .91 \ln(x-5) + 1$$

v. Shrink right 5 up 1

$$19 \text{ a) } e^a = e^{3x}$$

$$e^a = e^{3x-9}$$

$$a = 3x-9$$

$$|x=6|$$

$$\text{b) } 2(3)^{x/5} = 162$$

$$3^{x/5} = 81$$

$$3^{x/5} = 3^4$$

$$x/5 = 4 \quad |x=20|$$

$$20 \text{ a) } 4 \ln x - \ln 2 = \ln 128$$

$$\cancel{\ln} \frac{x^4}{2} = \cancel{\ln} 128$$

$$x^{4/2} = 128$$

$$x^2 = 256$$

$$|x=4|$$

$$\text{b) } \log_4 256 = x$$

$$4^x = 256$$

$$|x=4|$$

$$\text{c) } \log_2(3x+1) = 6$$

$$\rightarrow 2^6 = 3x+1$$

$$64 = 3x+1$$

$$63 = 3x$$

$$|x=21|$$