LESSON 99

1. $1/x$ **2.** 2 **3.** e^{3x} **4.** 2

5. 1 **6.** A **7.** $y = 1$

8. $f(x) = 2(3)^x$ **9.** $y = 20(2)^{t/3}$

10. About \$3,560

Worked-out solutions:

1 $\dfrac{(2x^{-2})(8x^5)}{16x^4} = \dfrac{2 \cdot 8}{16} x^{-2+5-4} = x^{-1} = \dfrac{1}{x}$

2. $\left(\dfrac{x^3}{3x^{-6}}\right)^2 = \dfrac{(x^3)^2}{(3x^{-6})^2} = \dfrac{x^6}{3^2 x^{-12}} = \dfrac{1}{3^2} x^{6-(-12)} = \dfrac{1}{9} x^{18}$

$ak = (1/9)(18) = 2$

3. $(4e^x)(2e^{-x})^{-2} = (2^2 e^x)(2^{-2} e^{2x}) = 2^0 e^{3x} = e^{3x}$

4. $3^{2x} = 81$

$3^{2x} = 3^4$	Rewrite using base 3.
$2x = 4$	One-to-one property
$x = 2$	Solve for x.

5. $4^{3-x} = 8^{x+2}$

$(2^2)^{3-x} = (2^3)^{x+2}$	Rewrite using base 2.
$2^{2(3-x)} = 2^{3(x+2)}$	Exponent rules
$2(3-x) = 3(x+2)$	One-to-one property
$x = 0$	Solve for x.

$2^x = 2^0 = 1$

6. e is a number greater than 2 but less than 3, so the graph will have the same shape as $y = 2^x$.

7. $f(x)$ is $y = 2^x$ shifted up 1 unit.

The asymptote of the graph of $y = 2^x$ is $y = 0$, so the asymptote of the graph of $f(x)$ is $y = 1$.

8. $f(x) = ab^x$

$2 = ab^0$	Plug in $(0, 2)$.
$a = 2$	Zero exponent rule ($b^0 = 1$)

$f(x) = ab^x$

$6 = 2b^1$	Plug in a and $(1, 6)$.
$b = 3$	Divide both sides by 2.
$f(x) = 2(3)^x$	Write the function.

9. a = initial number of bacteria $= 20$

b = growth factor $= 2$

$t/3$ = exponent because the y-value doubles (is multiplied by 2) at $t = 3, 6, 9, \ldots$.

The function is $y = 20(2)^{t/3}$.

10. a = initial value $= 20000$

$b = 100\% - 25\% = 75\% = 0.75$ because the new value is 75% of the previous value.

The function $y = 20000(0.75)^t$ models the value of the car after t years.

When $t = 6$, $y = 3559.57031\ldots$.

The value of the car will be about \$3,560.