COLLEGE ALGEBRA

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GPS # 26   3.1   EXPONENTIAL FUNCTIONS II   Class Time: T/Th 11:30 Date: 3-4-08

Useful Guidelines:

* The **Base e** is defined as the number that the expression $\left(1+\frac{1}{n}\right)^n$ approaches as n becomes very large.

* In limit notation, $e = \lim\limits_{x \to \infty}\left(1+\frac{1}{n}\right)^n$.

e^{x+1} sift to left e^{x-2} sift to right

* Exponential equations: Equations that involve terms of the form a^x, where $a > 0$ and $a \neq 1$.
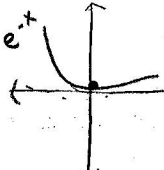
* Property of the exponents: If $a^u = a^v$, then $u = v$.

[Note: To solve exponential equations, each side of the equation must be written in the same base.]

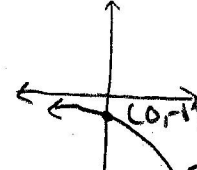1. Begin with the graph of $f(x) = e^x$ and use transformation to graph each function.
   Determine the y-intercept, domain, range, and horizontal asymptote of each function.
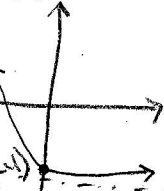
(a) $f(x) = e^{-x} = \left(\frac{1}{e}\right)^x$

HA: $y = 0$
D: $(-\infty, \infty)$
R: $(0, \infty)$
Y inter: $(0,1)$

(b) $f(x) = -e^x$ growth
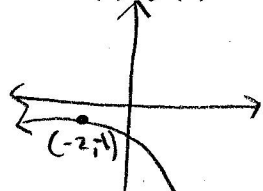

H.A: $y = 0$
D: $(-\infty, \infty)$
R: $(-\infty, 0)$
Y inter: $(0,-1)$
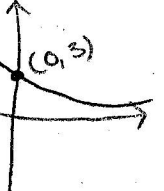
(c) $f(x) = e^{-x} - 5 = \left(\frac{1}{e}\right)^x - 5$

H.A: $y = -5$
D: $(-\infty, \infty)$
R: $(-5, \infty)$
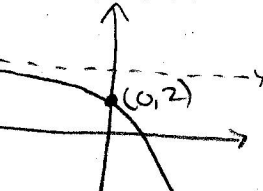Y inter: $(0,-4)$

(d) $f(x) = -e^{x+2}$ growth

H.A.: $y = 0$
Y inter: $(0, -e^2)$
D: $(-\infty, \infty)$
R: $(-\infty, 0)$

(e) $f(x) = 3e^{-x} = 3\left(\frac{1}{e}\right)^x$

Y intercept: $(0,3)$
d: $(-\infty, \infty)$
R: $(0, \infty)$
HA: $y = 0$

(f) $f(x) = -e^{2x} + 3$ growth

H.A: $y = 3$
Y inter: $(0,2)$
D: $(-\infty, \infty)$
R: $(-\infty, 3)$

2. Solve each equation.

(a) $5^{4x-3} = 25$

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

$4x - 3 = 2$
$\quad -3 \quad -3$
$\dfrac{4x}{4} = \dfrac{5}{4}$

$x = \dfrac{5}{4}$

(b) $2^{x^2-21} = 16$

$2^{x^2-21} = 2^4$

$x^2 - 21 = 4$
$\quad +21 \quad +21$
$\sqrt{x^2} = \sqrt{25}$

$x = \pm 5$

(c) $e^{-x^2} = e^{6x-7}$

$-x^2 = 6x - 7$
$+x^2 \quad +x^2$
$0 = x^2 + 6x - 7$
$(x+7)(x-1) = 0$

$x = -7$
$x = 1$

(d) $e^{x^2} = \dfrac{e^{10}}{e^{3x}}$

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

$x^2 = 10 - 3x$
$x^2 + 3x - 10 = 0$

$x = -5$
$x = 2$