COLLEGE ALGEBRA

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GPS # 26 | 3.1 | EXPONENTIAL FUNCTIONS II | Class Time: 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, $e = \lim_{x\to\infty}\left(1+\frac{1}{n}\right)^n$.

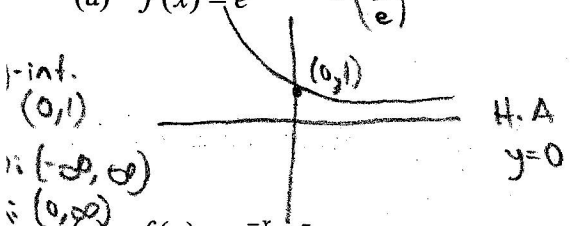
* Exponential equations: Equations that involve terms of the form a^x, where $a > 0$ and $a \neq 1$.

* 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.]

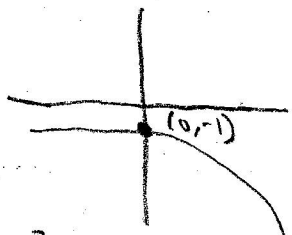
1. Begin with the graph of $f(x) = e^x$ and use transformation to graph each function.
Determine the y-intercept, domain, range, and horizontal asymptote of each function.

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



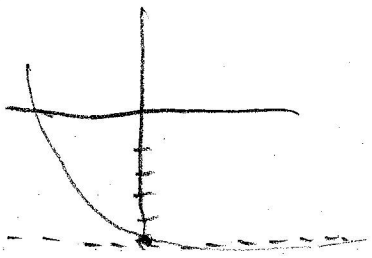
y-int: (0,1)
D: $(-\infty,\infty)$
R: $(0,\infty)$

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



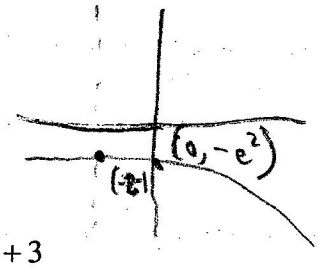
H.A
y = 0
y-int: (0,-1)
D: $(-\infty,\infty)$
R: $(-\infty,0)$
$-e^x$

(c) $f(x) = e^{-x} - 5$ $= \left(\frac{1}{e}\right)^x - 5$



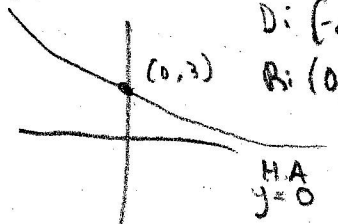
H.A
y = -5
D: $(-\infty,\infty)$
R: $(-5,\infty)$

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



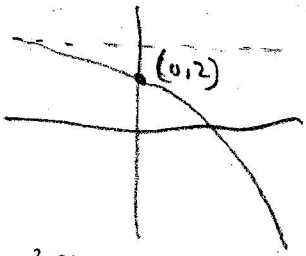
D: $(-\infty,\infty)$
R: $(-\infty,0)$
HA: y=0
y-int: $(0,-e^2)$

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



y-int: (0,3)
D: $(-\infty,\infty)$
R: $(0,\infty)$

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



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

2. Solve each equation.

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

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

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

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

$x^2 - 21 = 4$
$+21 \quad +21$
$x^2 = 25$ $x = \pm 5$

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

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

(d) $e^{x^2} = \frac{e^{10}}{e^{3x}}$ $\frac{a^m}{a^n} = a^{m-n}$ $a^m \cdot a^n = a^{m+n}$

$e^{x^2} = e^{10-3x}$
$x^2 = 10 - 3x$
$x^2 + 3x - 10$ $(x-2)(x+5) = 0$
$x = 2$ $x = -5$