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 $u = v$.

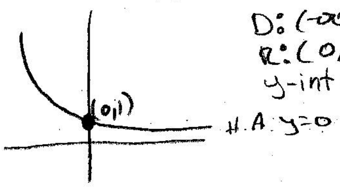
[Note: To solve exponential equations, each side of the equation must be written in the same base.]

20/20 Good Job!

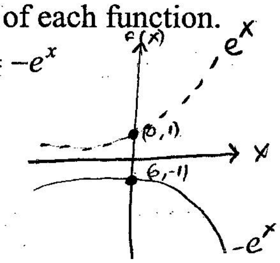
1. Begin with the graph of $f(x) = e^x$ and use transformation to graph each function.
Determine the y-intercept, domain, range, and horizontal asymptote of each function.

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

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



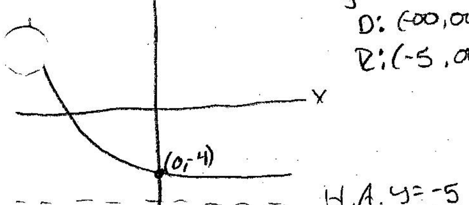
(b) $f(x) = -e^x$



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

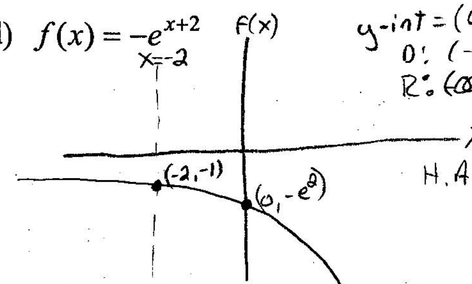
(c) $f(x) = e^{-x} - 5 = \left(\frac{1}{e}\right)^x - 5$

y-int $= (0,-4)$
D: $(-\infty,\infty)$
R: $(-5,\infty)$



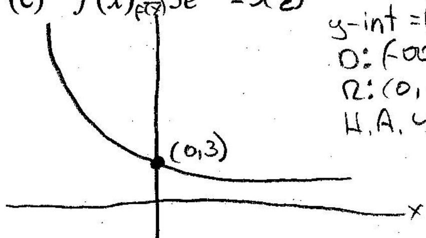
(d) $f(x) = -e^{x+2}$

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



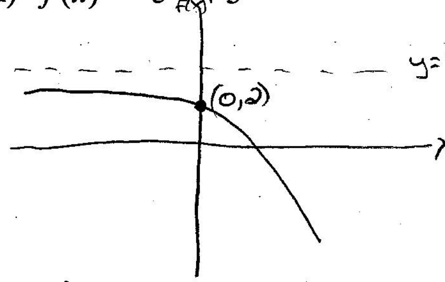
(e) $f(x) = 3e^{-x} = 3\left(\frac{1}{e}\right)^x$

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



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

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



2. Solve each equation.

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

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

$4x-3=2$

$4x=5$

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

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

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

$x^2-21=4$

$x^2=25$

$x=\pm5$

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

$0 = x^2+6x-7$

$0 = (x+7)(x-1)$

$x=-7 \quad x=1$

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

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

$x^2 = 10-3x$

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

$(x+5)(x-2)=0$

$x=-5 \quad x=2$