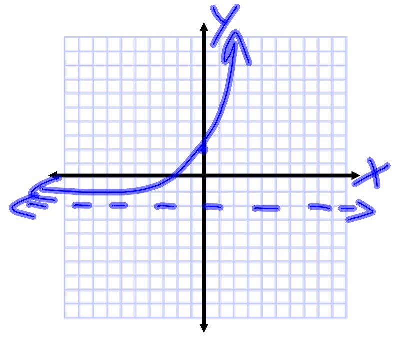
Day 2 on 3.1

I. Graph and ID any asymptotes.

Ex 1) $y = 4^{x+1} - 2$

H.A.: $y = -2$

$y = 4\wedge(x+1) - 2$



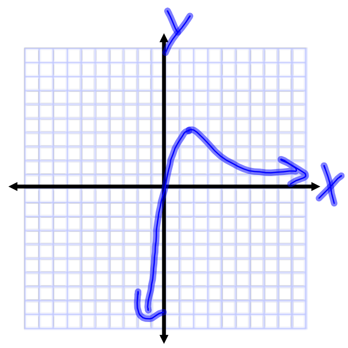
II. Graph and find intervals of increasing and decreasing and any minima and maxima values.

Ex 2) $f(x) = x\,(2^{3-x})$

increasing: $(-\infty, 1.44)$

decreasing: $(1.44, \infty)$

max: $(1.44, 4.25)$



III. Compound Interest: t = years, p = principal, r = rate, A = balance in account

1. For n compounding per year use: $A = p(1 + r/n)^{nt}$

2. For continuous compounding use: $A = pe^{rt}$

Ex 3) A total of \$9000 (p) is invested at an annual interest rate (r) of 2.5% compounded annually (n=1). Find the balance (A) after 5 years.

$A = p\left(1 + \frac{r}{n}\right)^{nt}$

$A = 9000\left(1 + \frac{0.025}{1}\right)^{1(5)}$

$A = \$10{,}182.67$

Ex 4) $12,000 is invested at 3%. What is the balance after 4 years if ...

A) compounded quarterly? B) continuously?

A.) $A = P\left(1+\frac{r}{n}\right)^{nt}$

$A = 12000\left(1+\frac{0.03}{4}\right)^{4(4)}$

$A = \$13,523.91$

B) $A = Pe^{rt}$

$A = 12000e^{0.03(4)}$

$A = \$13,529.96$

Ex 5) Radioactive Decay: Let y represent a mass of radioactive strontium, in grams, whose half-life is 28 years. The quantity of strontium after t years is $y = 10(1/2)^{t/28}$.

a) What is the initial mass (when t = 0)?

$y = 10\left(\frac{1}{2}\right)^{\frac{0}{28}} = 10 \cdot 1 = \boxed{10\text{ g}}$

b) How much of initial mass is present after 80 years?

$y = 10\left(\frac{1}{2}\right)^{\frac{80}{28}} = \boxed{1.38\text{ g}}$

Ex 6) The approximate number of fruit flies in an experimental population after t hours given by $Q(t) = 20e^{.03t}$, where $t \geq 0$.

a) Find the initial number of fruit flies?

$Q(0) = 20e^{0.03(0)} = 20 \cdot 1 = 20$ flies

b) After 72 hours, how large is the population?

$Q(72) = 20e^{0.03(72)}$

$= \boxed{173\text{ flies}}$