20080303 Quiz 7
Student name: SOLUTION

Calculators are allowed; a "cheat sheet" is on the other side

1. Solve for x: $\log_4(x) + \log_4(x-3) = 1$

   $\log_4(x) + \log_4(x-3) = 1$
   $\log_4\big(x(x-3)\big) = 1$
   $4^{\log_4(x(x-3))} = 4^1$
   $x(x-3) = 4$
   $x^2 - 3x = 4$
   $x^2 - 3x - 4 = 0$
   $(x-4)(x+1) = 0$
   $x = 4, x = -1$ are potential solutions but $x = -1$ is not possible because that would require log of a negative number. So the single solution is $x = 4$.

2. If you invest \$300 at 12% compounded monthly, how much will the investment be worth in $1\frac{1}{2}$ years?

   $P = \$300\ r = 12\%\ n = 12\ t = 1.5\ A = ?$
   $A = P\left(1 + \frac{r}{n}\right)^{nt} = 300\left(1 + \frac{12\%}{12}\right)^{12*1.5} = 300(1.01)^{18} = \$358.84$

Rules for exponential functions	Rules for logarithmic functions
$a^{s+t} = a^s a^t$	$\log_a(uv) = \log_a(u) + \log_a(v)$
$a^{-x} = \frac{1}{a^x}$	$\log_a\left(\frac{1}{u}\right) = -\log_a u$
$a^0 = 1$	$\log_a(1) = 0$
$a^1 = a$	$\log_a(a) = 1$
$a^{s-t} = \frac{a^s}{a^t}$	$\log_a\left(\frac{u}{v}\right) = \log_a(u) - \log_a(v)$
$(a^s)^t = a^{st}$	$\log_a(u^t) = t\log_a(u)$
$(a^s)^t = a^{st}$	$\log_b(u) = \frac{\log_a(u)}{\log_a(b)}$ $\log_a(u) = \log_a(b) \cdot \log_b(u)$

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