Sec 4.4
Applications

Medical research indicates that the risk of having a car accident increases exponentially as the concentration of alcohol in the blood increases. The risk is modeled by $R = 6e^{12.77x}$ where x is the blood alcohol concentration and R, given as a percent, is the risk of having a car accident. What BAC corresponds to a 17% risk of a car accident?

$R = 6e^{12.77x}$

$17 = 6e^{12.77x}$

$2.83 = e^{12.77x}$

$\ln 2.83 = \ln e^{12.77x}$

$\ln 2.83 = 12.77x$

$.081 \approx x$

.082

How long will it take $25,000 to grow to $500,000 at 9% annual interest compounded monthly?

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

$$500000 = 25{,}000\left(1+\frac{.09}{12}\right)^{12t}$$

$$20 = (1.0075)^{12t}$$

$$\ln 20 = \ln 1.0075^{12t}$$

$$\ln 20 = 12t \ln 1.0075$$

$$\frac{\ln 20}{12 \ln 1.0075} = t \approx 33.4 \text{ years}$$

divide both sides by these to isolate "t".

The percentage of adult height attained by a boy who is x years old is modeled by f(x) = 29 + 48.8 log (x+1) where x represents the boy's age (5-15) and f(x) represents the percentage of adult height. At what age, rounded to the nearest year, has a boy attained 85% of his adult height?

$85 = 29 + 48.8 \log(x+1)$

$56 = 48.8 \log(x+1)$

$1.147 = \log(x+1)$

$10^{1.147} = x+1$

$13\text{yrs.} \approx x$

Suggested Practice
Sec 4.4, pgs 490-491

103, 105
(disregard graph question), 107,
111,
115ab (disregard graph question)

103. a. 37.3 million
b 2017

105. 118 feet

107. 8.2 years

111. 8.7 years

115a. 17%
b. 2016