SECTION 4.2

4.2.1 Find the exact value for $\log_2 32$ without use of a calculator.

4.2.2 Find the exact value for $\log_{\sqrt{6}} 6$ without use of a calculator.

4.2.3 Find the exact value for $\log_2\left(\frac{1}{64}\right)$ without use of a calculator.

4.2.4 Solve for x if $5^x = 625$.

4.2.5 Solve for x if $6^x = 1/216$.

4.2.6 Find the domain of f if $f(x) = \log_{10}(4x - 3)$.

4.2.7 Find the domain of f if $f(x) = \log_5\left(x^2 - 4\right)$.

4.2.8 Show that, to any base, $2\log\sin\theta = \log(1 - \cos\theta) + \log(1 + \cos\theta)$, $0 < \theta < \pi$.

4.2.9 Show that $\log_a \frac{6}{5} - \log_a 300 + \log_a 125 = -\log_a 2$.

4.2.10 Show that $\log_a \frac{9}{32} + \log_a \frac{256}{3} + \log_a \frac{3}{8} + \log_a \frac{1}{3} = \log_a 3$.

4.2.11 Show that $\log_a 3\sqrt{x} - \log_a \frac{9}{\sqrt{x^3}} - \log_a \frac{1}{3} = 2\log_a x$.

4.2.12 Show that

$$\log_a \sqrt[3]{\frac{(x+2)^3}{x^3 - 8}} = \log_a(x+2) - \frac{1}{3}\log_a(x-2) - \frac{1}{3}\log_a\left(x^2 + 2x + 4\right).$$

4.2.13 Solve for x if $3^x = 9^{2x-1}$.

4.2.14 Solve for x if $\log_a x + \log_a(x+2) = 0$.

4.2.15 Solve for x if $\log_{10}(x+1) - \log_{10}(x-2) = 1$.

4.2.16 A radioactive isotope is transformed into another more stable isotope of a certain element by

$$A(t) = 0.0125e^{-t/500}$$

where t is the time in seconds and A is the amount present in mgms.

(a) How much of the isotope was originally present?

(b) When will half of the original amount be transformed?

(c) When will 0.005 mgms of the original isotope remain?

4.2.17 A bacterial population grows by an amount given by

$$N(t) = 135e^{t/125}$$

where N is the number of bacteria present and t is the time in minutes.

(a) How many bacteria were originally present?

(b) In how many minutes will the original number of bacteria double?

(c) In how many minutes will the original number of bacteria triple?

(d) When will there be 185 bacteria present?