1. **(T1.3, T2.9 - R) (CA)** Mr. S has \$12,500 that he puts into an investment that earns *K*% p.a. compounded monthly.

(Cirrito 7.2, p209)

   a. Determine the value of his investment if he keeps this investment for 10 years and the interest rate, *K*, is equal to 6%.
   b. Interest is now compounded continuously. What would the value of *K* have to be if Mr S wants the investment value to be \$20,000 in 15 years?

2. **(T3.7 - R) (CA)** The monthly sales, S (in hundreds of litres of milk) is modelled by the function $S(t) = 13 + 5.5cos\left(\frac{\pi t}{6} - 3\right),\ t > 0$ where *t* is the time in months with *t* = 0 corresponding to January 1st, 2010. (HINT: switch TI-84 to radian mode)

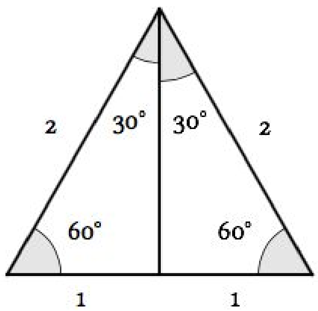
(Cirrito 10.5, p361)

   a. Find the minimum and maximum sales during 2011.
   b. Find the value of *t* for which the sales first exceed 1500 litres. Solve algebraically.
   c. During which months do the weekly sales exceed 1500 litres? Solve graphically.

3. **(T3.4; 3.5 - E) (CI)** By considering an equilateral triangle with side length 2, find in exact form the values of:

(Cirrito 10.1.1, p315)

   a. sin 30°, cos 30°, tan 30°, sin 60°, cos 60°, tan 60°.
   b. Hence, determine the sin and cos ratios of an angle of $\frac{2\pi}{3}$



4. **(F2.2, F2.6 - E) (CI)** The function $y = f(x)$ is defined as $f(x) = 2e^x - 1$.

(Cirrito 7.1.5, p207; Cirrito 5.3.3, p131)

   a. Determine the equation of the horizontal asymptote of *f*.
   b. Determine the *x*- and *y*-intercept(s) of *f*.
   c. Sketch $f(x) = 2e^x - 1$, labeling the features you found in Qa and Qb.
   d. Sketch the inverse, $y = f^{-1}(x)$, given your work in Qc.
   e. Determine the equation of the inverse of *f*.

5. **(T3.4 - E) (CI)** If $\sin(\theta) = -\frac{3}{5}$ and $\cos(\theta) < 0$, find:

(Cirrito 10.1.2, p316)

   a. what quadrant the angle θ is in,
   b. the values for $\cos(\theta)$ and $\tan(\theta)$,
   c. hence, evaluate $5 - \frac{2}{sin^2\theta} + \frac{2}{tan^2\theta}$

6. (**T2.6 - R**) **(CI)** Given the quadratic function $f(x) = 4x^2 - 4x - 15$.

(Cirrito 2.4.2, p44)

a. Find the zeroes of this function.
b. Find the optimal point of this function.
c. Is this optimal point a maximum or minimum? Show/explain your reasoning.

7. **(T2.2, 2.4, 2.9 - R) (CA)** A biologist is observing the growth of two bacterial populations during an experiment testing a new drug. The first bacterial population, $A(t)$, is modelled by the function $A(t) = at^2 + b$, where t is time in hours after the experiment started. This population started with 900 bacteria and the biologist notices that after 5 hours all these bacteria have died.

(Cirrito 7.2, p209)

a. Find the values of a and b in the equation $A(t) = at^2 + b$.

The second population, $B(t)$, is modelled by the function $B(t) = \dfrac{1000}{1 + 49e^{-2t}}$

b. Complete the table of values for $B(t)$ for $0 \leq t \leq 6$.
c. What is the initial number for the population of $B(t)$?
d. As time increases, what appears to be the limiting value of the number of bacteria for $B(t)$?
e. After what time is the population of $B(t) = 500$ (try this one algebraically)
f. Draw the graphs of $A(t)$ and $B(t)$ and state a solution for $A(t) > B(t)$. Interpret your answer.

8. **(T4.2 - R) (CI)** Consider the following data set:

(Cirrito 13.2, p471)

12, 4, 9, 10, 12, 13, 15, 11, 12, 15, 14, 8, 9, 10, 12, 9, 10, 16, 14, 13, 12, 15, 9, 10, 12

a. Construct a:

   i. A histogram using an interval width of 2
   ii. The corresponding frequency polygon to Q a. i.
   iii. The cumulative frequency polygon

b. Calculate the mean of the data set.
c. Determine the median and mode and the interquartile range.
d. Construct a box-whisker plot