1. (GT $3.5-\mathbf{E})(\mathbf{C I})$ For each of the following angles, determine the value of the sine, cosine, and tangent ratios.
(Cirrito 8.2.3, p261)
a. $\frac{\pi}{3}$
b. $\frac{5 \pi}{4}$
C. $\frac{3 \pi}{2}$
d. $\frac{11 \pi}{6}$
e. $\frac{7 \pi}{6}$
f. $\quad-\frac{3 \pi}{4}$
 $\lim _{h \rightarrow 0} \frac{f(x+h)-f(x)}{h}$. This is often referred to as the "First Principle of Calculus," or 'first principles' for short. Using this formula determine the "derivative" (aka the slope/gradient function) of the following functions. Show all of your algebra (that is, do not use any short-cuts)
(Cirrito 8.2.3, p261)
a. $f(x)=3 x^{2}+x-5$
b. $g(x)=-x^{2}-10 x+7$
c. $\quad h(x)=4 x^{2}-7$
2. ( $\mathbf{F 2 . 8} \mathbf{- \mathbf { R }}$ ) (CA) Given the following function: $f(x)=\frac{3 x-2}{2 x+3}$
(Cirrito 8.2.3, p261)
a. Determine the asymptotes of $f(x)$.
b. Determine the intercepts of $f(x)$.
c. Consider the function $g(x)=-x^{2}+4 x-1$. Determine the solution to $f(x)=g(x)$
d. Hence determine when $f(x)<g(x)$.
3. (NA1.2-N) (CA) In mathematics we use the capital Greek letter sigma, $\Sigma$, to deonte a sum. Find each of the following sums:
(Cirrito 8.1.3, p.249)
a. $\sum_{k=1}^{100} k$
b. $\sum_{k=1}^{100}(2 k+1)$
c. $\quad \sum_{k=1}^{51}(3 k+5)$
4. (NA1.2-E) (CA) An arithmetic series has a first term of -4 and a common difference of 1. A geometric series has a first term of 8 and a common ratio of 0.5 . After how many terms does the sum of the arithmetic series exceed the sum of the geometric series?
(Cirrito 8.2.3, p261)
5. (NA1.2-N)(CI) Mr. S. would like to solve the equation $\log _{4}(x+1)+\log _{\frac{1}{10}}(x+1)=1$.
(Cirrito 7.4, p244)
a. Explain why he cannot start by using the 'addition rule' of logarithms.
b. Re-express $\log _{\frac{1}{16}}(x+1)$ in terms of $\log$ base 4 (i.e. $\log _{4}($ ??))
c. Hence or otherwise, solve the equation $\log _{4}(x+1)+\log _{\frac{1}{10}}(x+1)=1$.
6. (SP4.7-E) (CA) Given the following table for a discrete random variable, $X$, (say the number of times this week that Mohamed is late to Math class)
(Cirrito C16.1, p533)

| $x$ | 1 | 2 | 3 |
| :---: | :---: | :---: | :---: |
| $P(X=x)$ | 0.2 | $1-k$ |  |

a. Determine $\mathrm{P}(X=3)$. Express your answer in terms of $k$.
b. What range of values can $k$ take?
c. Find, in terms of $k$, the mean of the distribution.
d. Now suppose that $k=0.35$. Find the mean and variance of the distribution.
e. Now suppose that $k=0.35$. Determine $P(X=3 \mid X \geq 2)$
8. (SP4.6-E) (CA) A bag consists of 6 white cubes and 10 black cubes. Cubes are withdrawn one at a time, with replacement. Use a tree diagram to help find the probability that after 4 draws
(Cirrito 16.3.4, p544)
a. all the cubes are black;
b. there are 3 black cubes;
c. there are two black cubes;
d. there is one black cube;
e. there are no black cubes.
f. What observations or connections do you make about this entire process?

