exercise 1:
(i). Let $\theta$ be a real number. Using double angle formulas, show that $\cos \frac{\theta}{2} + i \sin \frac{\theta}{2}$ is a square root of $\cos \theta + i \sin \theta$.
(ii). Let $z$ be a non zero complex number. Show that $z$ has exactly two square roots.
**Hint:** As $z = |z| \frac{z}{|z|}$, $z = r(\cos \theta + i \sin \theta)$ for some positive $r$ and some $\theta$ in $\mathbb{R}$.
(iii). Let $a$ and $b$ be in $\mathbb{C}$. Show that the quadratic equation $z^2 + az + b = 0$ has one or two solutions in $\mathbb{C}$.

exercise 2:
Let $\theta$ be a real number and $n$ a positive integer. Using appropriate trig formulas, show by induction on $n$ that
\[(\cos \theta + i \sin \theta)^n = \cos n\theta + i \sin n\theta.\]
Is this formula true for all $n$ in $\mathbb{Z}$?

exercise 3:
From your textbook: 1.3.8, (a) and (b).

exercise 4:
From your textbook: 1.3.13.

exercise 5:
Let $V$ be an $F$-vector space and $S$ and $T$ be two finite subsets of $V$ which are non empty and such that $S \subset T$.
(i). Show that span($S$) is a subspace of span($T$).
(ii). If span($S$) = $V$ show that span($T$) = $V$.
(iii). If $T$ is an independent set, show that $S$ is an independent set.

exercise 6:
From your textbook: 1.5.2.: a, b, c.

exercise 7:
Let $V$ be an $F$-vector space and $S = \{v_1, ..., v_n\}$ an independent subset of $V$. Let $v_{n+1}$ be in $V$. Show that $T = \{v_1, ..., v_{n+1}\}$ is an independent subset of $V$ if and only if $v_{n+1} \notin$ span ($S$).
exercise 8:
From your textbook: 1.5.9.

exercise 9:
From your textbook: 1.6.4.

exercise 10:
From your textbook: 1.6.5.

exercise 11:
From your textbook: 1.6.9.

exercise 12:
From your textbook: 1.6.31.

exercise 13:
From your textbook: 1.6.32.