Miscellaneous Exercise on Chapter 7

1. If a and b are distinct integers, prove that $a - b$ is a factor of $a^n - b^n$, whenever n is a positive integer.

[**Hint** write $a^n = (a - b + b)^n$ and expand]

2. Evaluate $\left(\sqrt{3}+\sqrt{2}\right)^6 - \left(\sqrt{3}-\sqrt{2}\right)^6$.

3. Find the value of $\left(a^2+\sqrt{a^2-1}\right)^4 + \left(a^2-\sqrt{a^2-1}\right)^4$.

4. Find an approximation of $(0.99)^5$ using the first three terms of its expansion.

5. Expand using Binomial Theorem $\left(1+\frac{x}{2}-\frac{2}{x}\right)^4$, $x \neq 0$.

6. Find the expansion of $(3x^2 - 2ax + 3a^2)^3$ using binomial theorem.