Binomial Theorem

1) Using binomial theorem, expand each of the following;
   i) $(1+x)^5$
   ii) $(2x+y)^6$
   iii) $(x-\frac{1}{y})^5$
   iv) $(x^2-\frac{2}{x})^4$

2) Evaluate:
   i) $(\sqrt{2}+1)^5-(\sqrt{2}-1)^5$
   ii) $(2+\sqrt{3})^7+(2-\sqrt{3})^7$

3) Find the middle term in the expansion of $(3x-\frac{x^3}{6})^7$.

4) Find the term independent of x in the expansion of $\left(x^2+\frac{2}{x}\right)^{15}$

5) Which is larger, $(1.01)^{100000}$ or 10000?

6) Find a if the 17th and 18th terms of $(2+a)^{50}$ are equal.

7) Find the coefficient of x^6y^3 in the expansion of $(x+2y)^9$.

Bonus:

8) The second, third and fourth terms in the binomial expansion of $(x+a)^n$ are 240, 720 and 1080. Find x, a and n.
9) Expand using binomial theorem $(1+\frac{x}{2}-\frac{2}{x})^4$, with $x \neq 0$.