IN-CLASS ACTIVITY : PRE-CALCULUS REVIEW

1. Decide whether the following statements are true or false :
   i) If $x > 0$, then $x^2 > 0$;
   ii) If $x^2 > 0$, then $x > 0$;
   iii) $x^2 > 0$ for every real number x ;
   iv) If $x < 3$, then $x^2 < 9$;
   v) $(x + y)^2 = x^2 + y^2$ for every real number x and y ;
   vi) $(x + y)^{-1} = x^{-1} + y^{-1}$ for every $x, y > 0$.

2. Find the value of a that makes the following equalities true :

   i) $\sqrt[4]{a} = 3$;
   ii) $\sqrt[a]{16} = 4$;
   iii) $\sqrt{a^{\frac{3}{2}}} = 27$;
   iv) $\sqrt{a^{-\frac{1}{2}}} = \frac{1}{4}$;
   v) $2^{-a} = \frac{1}{8}$;

   vi) $\sqrt{2}\sqrt{2} = \sqrt{a}$;
   vii) $\sqrt{\sqrt[3]{2}} = \sqrt[a]{2}$;
   viii) $\sqrt{2\sqrt{2}} = \sqrt[a]{8}$;
   ix) $\sqrt{4\sqrt{2}} = \sqrt{2^a}$;
   x) $\sqrt[6]{8} = \sqrt[a]{4}$;

   xi) $\sqrt{2} + \sqrt{2} = a\sqrt{2}$;
   xii) $\sqrt[a]{2} + \sqrt[3]{2} = 2$;
   xiii) $\sqrt{2} + \sqrt{2} = \sqrt{a}$;
   xiv) $\sqrt{3\sqrt{2\sqrt{3}}} = \sqrt[8]{a}$;
   xv) $\sqrt{8}\sqrt[3]{2^a}\sqrt[4]{8} = 8$.

3. Factorize (if possible, over the reals) the following polynomials

   i) $x^2 - 1$;
   ii) $x^4 - 1$;
   iii) $x^2 + 1$;
   iv) $x^3 - 2x^2$;
   v) $x^2 - 7x + 12$;

   vi) $2x^2 + 5x - 3$;
   vii) $x^4 - 5x^2 + 4$;
   viii) $x^6 + 5x^3 + 6$;
   ix) $x^3 - 2x + 1$;
   x) $x^5 - x^3 + x^2 - 1$.

4. Find the set of solutions of the following inequalities ;
   i) $x^2 - 9 \geq 0$;
   ii) $x^2 - 4x + 3 \geq 0$;
   iii) $-x^2 + 6x - 9 > 0$;
   iv) $x^4 - 3x^2 + 4 \geq 0$;
   v) $\frac{x^2 - 2x - 3}{x^2 - 6x + 5} \leq 0$.