1. Perform polynomial division.
   (a) $\dfrac{x^3+2x^2-3x-6}{x+2}$ x^2-3
   (b) $\dfrac{x^5+x^3+3x^2-4}{x^2+1}$ $x^3+2x+3+\frac{2x-1}{x^2-1}$
   (c) $\dfrac{x^3-2x^2+4x+1}{x-3}$ $x^2+x+7+\frac{22}{x-3}$

2. What is the remainder when you divide the following polynomial by $x+1$?
   (a) $p(x)=2x^3+3x^2+x+8$ -14
   (b) $p(x)=x^4+x^3+x-2$ -5
   (c) $p(x)=x^3+4x^2+2x-1$ -8

3. When does a the graph of a quadratic equation open upward, and when does it open downward? (Hint: Leading Coefficient) When the leading coefficient is positive the graph opens upward, when the leading coefficient is negative the graph opens downward.

4. For the following quadratic equations find (i) the vertex, (ii) the x-intercepts (how many are there?), (iii) the y-intercepts, and (iv) sketch the graph.
   (a) $f(x)=x^2-3x+8$
      i. $(\frac{3}{2},\frac{23}{4})$
      ii. None, discriminant <0
      iii. $(0,8)$
   (b) $f(x)=2x^2-4x-1$
      i. $(1,-3)$
      ii. 2 x-intercepts, $x=1\pm\frac{\sqrt{6}}{2}$
      iii. $(0,-1)$
   (c) $f(x)=x^2+2x-3$
      i. $(-1,-4)$
      ii. 2 x-intercepts, $x=1, x=-3$
      iii. $(0,-3)$

5. What are the shifts and reflections needed to obtain these graphs from a basic fucntion? State the basic function in each scenario and sketch the graph of $g(x)$.
   (a) $g(x)=(x-3)^2+1$ $f(x)=x^2$, shift right 3 units, up 1 unit
   (b) $g(x)=-x^3+1$ $f(x)=x^3$, reflect across the x axis (or y) and shift up 1
   (c) $g(x)=-\frac{1}{(x-1)^2}$ $f(x)=\frac{1}{x^2}$, reflect across the x axis, and right 1 unit.
   (d) $g(x)=\sqrt{x}+2$ $f(x)=\sqrt{x}$, shift up 2 units