Algebra Review

You might recall the following factoring formulas: $x^3 - y^3 = (x-y)(x^2+xy+y^2)$ and $x^3 + y^3 = (x+y)(x^2-xy+y^2)$

1. Factor each polynomial:

   (a) $36z^2 - 81y^4$

   (b) $16p^2 - 40p + 25$

   (c) $64 - x^6$ (Hint: difference of cubes)

   (d) $9(a-4)^2 + 30(a-4) + 25$

   (e) $4x^2y^2 + 28xy + 49$

   (f) $(3p^r + 2q^r)^2 - 9$

   (g) $6p^4 + 7p^2 - 3$

   (h) $2p^2 + 7p - 4$

2. Find a value of b that will make each expression a perfect square: $k^2+bk+16$, $4z^2+bz+81$

3. Simplify (your answer should not contain negative exponents, where applicable):

   (a) $\frac{1+\frac{1}{x}}{1-\frac{1}{x}}$

   (b) $\frac{1}{h}\left(\frac{1}{(x+h)^2+9} - \frac{1}{x^2+9}\right)$

   (c) $\left(\frac{y}{y^2-1} - \frac{y}{y^2-2y+1}\right)\left(\frac{y-1}{y+1}\right)$

   (d) $\frac{a^{-1}+b^{-1}}{(ab)^{-1}}$

   (e) $(a+b)^{-1}(a^{-1}+b^{-1})$

   (f) $\frac{1}{x^2+x-12} - \frac{1}{x^2-7x+12} + \frac{1}{x^2-16}$

   (g) $\frac{2k}{k^2+4k+3} + \frac{3k}{k^2+5k+6}$

   (h) $\frac{\frac{1}{x+y}}{\frac{1}{x}+\frac{1}{y}}$

   (i) $\frac{5m+25}{10} \cdot \frac{12}{6m+30}$

   (j) $\frac{\frac{4a+12}{2a-10}}{\frac{a^2-9}{a^2-a-20}}$

   (k) $\frac{r^2-r-6}{r^2+r-12}$

   (l) $\left(3+\frac{2}{y}\right)\left(3-\frac{2}{y}\right)$

   (m) $\frac{x^2-y^2}{(x-y)^2} \cdot \frac{x^2-xy+y^2}{x^2-2xy+y^2} \div \frac{x^3+y^3}{(x-y)^4}$