d) $\sum_{j=0}^{8} (2^{j+1} - 2^j) = \cancel{2^j}\cdot 2 - \cancel{2^j}\cdot 1 = 2-1 = 1$

$\sum_{j=0}^{8} 2^j = \frac{2^{8+1}}{2-1} = \boxed{511}$

36) Compute each of these double sums

a) $\sum_{i=1}^{3}\sum_{j=1}^{2} (i-j) = \sum_{i=1}^{3}\left(\sum_{j=1}^{2} i - \sum_{j=1}^{2} j\right) = \sum_{i=3}^{3}(2i-3) = 2\sum_{i=1}^{3} i - \sum_{i=1}^{3} 3 = 2+4+6-9 = \boxed{3}$

b) $\sum_{i=0}^{3}\sum_{j=0}^{2} (3i+2j) = \sum_{i=0}^{3}\left(3\sum_{j=0}^{2} i + 2\sum_{j=0}^{2} j\right) = \sum_{i=0}^{3}\left(3(3i)+2(3)\right) = \sum_{i=0}^{3}(9i+6) = 9(6)+6(4) = \boxed{78}$

c) $\sum_{i=1}^{3}\sum_{j=0}^{2} j = \sum_{i=1}^{3}(0+1+2) = 3(3) = \boxed{9}$

d) $\sum_{i=0}^{2}\sum_{j=0}^{3} i^2 j^3 = \sum_{i=0}^{2} i^2\left(\sum_{j=0}^{3} j^3\right) = \sum_{i=0}^{2} i^2(1+8+27) = \sum_{i=0}^{2} 36i^2 = 36(1+4) = \boxed{180}$

40) Use identity $\frac{1}{k(k+1)} = \frac{1}{k} - \frac{1}{k+1}$ & ex 19 to compute $\sum_{k=1}^{n} \frac{1}{k(k+1)}$

Telescoping 19 gives $\sum_{j=1}^{n}(a_j - a_{j+1}) = a_1 - a_{n+1}$ by telescoping def

for $\sum_{k=1}^{n} \frac{1}{k(k+1)} = \left(\frac{1}{n} - \frac{1}{n+1}\right)$ for the n^{th} value or $a_k = \frac{1}{k}$

then $\sum_{k=1}^{n} \frac{1}{k(k+1)} = 1 - \frac{1}{n+1} = \boxed{\frac{n}{n+1}}$

48) Find $\sum_{k=99}^{200} k^3$

$\sum_{k=1}^{200} k^3 - \sum_{k=1}^{98} k^3 = \frac{200^2 \cdot 201^2}{4} - \frac{98^2 \cdot 99^2}{4} = \boxed{380{,}477{,}799}$