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Assignment # 1

1) $\sum_{i=0}^{n-1}\sum_{i=0}^{n-1} 1 = \sum_{i=0}^{n-1} (n-1)-0+1 = \sum_{i=0}^{n-1} n = [(n-1)-0+1]n \approx \boxed{\Theta(n^2)}$

2) $\sum_{i=0}^{n-1}\sum_{j=i+1}^{n-1} 1 = \sum_{i=0}^{n-1}(n-1)-(i+1)+1 = \sum_{i=0}^{n-1}[n-1-i-1+1] = \sum_{i=0}^{n-1}[n-i-1] =$

$= [n-1-0+1][n-1] = n(n-1) \approx \boxed{\Theta(n^2)}$

11) $\sum_{i=0}^{n-1}(i^2+2)^2 = \sum_{i=0}^{n-1}(i^4+4i^2+4) = \sum_{i=0}^{n-1} i^4 + \sum_{i=0}^{n-1}4i^2 + \sum_{i=0}^{n-1}4 =$

$\sum_{i=0}^{n-1}4 = 4\sum_{i=0}^{n-1}1 = 4(n-1-0+1) = 4n \approx \Theta(n)$

$\sum_{i=0}^{n-1}4i^2 = 4\sum_{i=0}^{n-1}\frac{(n-1)[(n-1)+1](2(n-1)+1)}{6} =$

$= \frac{(n-1)(n)(2n-1)}{6} = \frac{(2n^2-3n+1)(n)}{6} = \frac{2n^3-3n^2+n}{6} \approx \Theta(n^3)$

$\sum_{i=0}^{n-1} i^4 = \frac{1}{4+1}(n-1)^{4+1} = \frac{(n-1)^5}{5} \approx \Theta(n^5)$

$\approx \Theta(n^5)+\Theta(n^3)+\Theta(n) \approx \boxed{\Theta(n^5)}$

12) $\sum_{i=1}^{n}[(i+2)2^{i-1}] = \sum_{i=1}^{n}[(i+2)\frac{2^i}{2^1}] = \frac{1}{2}\sum_{i=1}^{n}(i2^i+2^{i+1}) =$

$= \frac{1}{2}\sum_{i=1}^{n}(i2^i) + \frac{1}{2}\sum_{i=1}^{n}[(2)(2^i)] = \frac{1}{2}\sum_{i=1}^{n}(i2^i)+\sum_{i=1}^{n}(2^i) =$

$\frac{1}{2}\sum_{i=1}^{n}(i2^i) = \frac{1}{2}[(n-1)2^{n+1}+2] = 2^n(n-1)+2 \approx \Theta(n2^n)$

$\sum_{i=1}^{n}(2^i) = \frac{2^{n+1}-1}{2-1} = 2^{n+1}-1 \approx \Theta(2^n)$

$\approx \Theta(n2^n)+\Theta(2^n) \approx \boxed{\Theta(n2^n)}$