

1(a)	$2n^2(n+1)^2 + 2n(n+1)(2n+1) + 2n(n+1) + 3n$
	$= 2n^4 + 8n^3 + 10n^2 + 7n$
1(b)	$\frac{1}{r^4} - \frac{1}{(r+1)^4} = \frac{(r+1)^4 - r^4}{r^4(r+1)^4} = \frac{r^4 + 4r^3 + 6r^2 + 4r + 1 - r^4}{r^4(r+1)^4} = \frac{4r^3 + 6r^2 + 4r + 1}{r^4(r+1)^4}$
	$\sum_{r=1}^n \frac{4r^3 + 6r^2 + 4r + 1}{r^4(r+1)^4} = \sum_{r=1}^n \left(\frac{1}{r^4} - \frac{1}{(r+1)^4} \right)$
	$= 1 - \frac{1}{2^4} + \frac{1}{2^4} - \frac{1}{3^4} + \dots + \frac{1}{n^4} - \frac{1}{(n+1)^4}$
	$= 1 - \frac{1}{(n+1)^4}$
1(c)	1

1(a)	$\sum_{r=1}^n (r^3 - r) = \frac{1}{4}n^2(n+1)^2 - \frac{1}{2}n(n+1)$
	$= \frac{1}{4}n(n+1)(n-1)(n+2)$
1(b)	$\frac{r+3}{r^3-r} = \frac{2}{r-1} - \frac{3}{r} + \frac{1}{r+1}$
	$\sum_{r=2}^n \frac{r+3}{(r-1)r(r+1)} = 2f(1) - 3f(2) + f(3)$
	$+2f(2) - 3f(3) + f(4)$
	$+2f(3) - 3f(4) + f(5)$
	$\vdots$ $+2f(n-2) - 3f(n-1) + f(n)$ $+2f(n-1) - 3f(n) + f(n+1)$
1(c)	$= \frac{3}{2} - \frac{2}{n} + \frac{1}{n+1}$
1(c)	$\frac{3}{2}$

3(a)	$\sum_{r=1}^n (r^3 + 6r^2 + 11r + 6) = \frac{1}{4}n^2(n+1)^2 + n(n+1)(2n+1) + \frac{11}{2}n(n+1) + 6n$
	$= \frac{1}{4}n(n^3 + 10n^2 + 35n + 50)$
3(b)	$\frac{2}{(r+1)(r+2)(r+3)} = \frac{1}{r+1} - \frac{2}{r+2} + \frac{1}{r+3}$
	$\sum_{r=1}^n \frac{2}{(r+1)(r+2)(r+3)} = f(1) - 2f(2) + f(3)$ $+ f(2) - 2f(3) + f(4)$ $+ f(3) - 2f(4) + f(5)$ $\vdots$ $+ f(n-1) - 2f(n) + f(n+1)$ $+ f(n) - 2f(n+1) + f(n+2)$
	$= \frac{1}{6} - \frac{1}{n+2} + \frac{1}{n+3}$
3(c)	$\frac{1}{6}$

1(a)	$(2-3r)(5-3r) = 9r^2 - 21r + 10$
	$9\left(\frac{1}{6}n(n+1)(2n+1)\right) - 21\left(\frac{1}{2}n(n+1)\right) + 10n$
	$= 3n^3 - 6n^2 + n$
1(b)	$\frac{1}{(2-3r)(5-3r)} = \frac{1}{3} \left(\frac{1}{2-3r} - \frac{1}{5-3r} \right)$
	$\sum_{r=1}^n \frac{1}{(2-3r)(5-3r)} = \frac{1}{3} \left(\frac{1}{-1} - \frac{1}{2} \right) + \frac{1}{3} \left(\frac{1}{-4} - \frac{1}{-1} \right) + \frac{1}{3} \left(\frac{1}{-7} - \frac{1}{-4} \right)$ $+ \dots + \frac{1}{3} \left(\frac{1}{2-3n} - \frac{1}{5-3n} \right)$
	$= -\frac{1}{6} + \frac{1}{3(2-3n)}$
1(c)	$\sum_{r=1}^{\infty} \frac{1}{(2-3r)(5-3r)} = -\frac{1}{6}$

4(a)	$w_{r+1} - w_r = (r+1)(r+2)\dots(r+10) - r(r+1)(r+2)\dots(r+9)$
	$(r+1)(r+2)\dots(r+9)(r+10-r) = 10(r+1)(r+2)\dots(r+9)$
4(b)	$\frac{1}{10}(w_2 - w_1) + \frac{1}{10}(w_3 - w_2) + \dots + \frac{1}{10}(w_{n+1} - w_n)$
	$= \frac{1}{10}(w_{n+1} - w_1) = \frac{1}{10}(n+1)(n+2)\dots(n+10) - \frac{10!}{10} = \frac{1}{10}(n+1)(n+2)\dots(n+10) - 9!$

4(c)	$v_1 + v_2 + \dots + v_n = x^{w_2} - x^{w_1} + x^{w_3} - x^{w_2} + \dots + x^{w_{n+1}} - x^{w_n} = x^{w_{n+1}} - x^{w_1}$
	For $-1 < x < 1$, sum to infinity is $-x^{w_1} = -x^{10!}$
	For $x = \pm 1$, sum to infinity is 0 .