Lec 12/7

Wednesday, December 7, 2016 9:18 AM

7) $$\int_0^{\pi} f'(x)\sin(4x)\,dx = \left[f(x)\sin(4x)\right]_0^{\pi} - 4\int_0^{\pi} f(x)\cos(4x)\,dx$$

$$\begin{bmatrix} u = \sin(4x) & du = 4\cos(4x) \\ v = f(x) & dv = f'(x)\,dx \end{bmatrix}$$

$$= \left[f(\pi)\sin(4\pi) - f(0)\sin(0)\right] - 12$$

$$= 6\cdot 0 - 0\cdot 0 - 12 = -12.$$

6) Want $P > \sum_{j=1}^{\infty} 1.05^{-j}\cdot j$

let $f(x) = \sum_{j=1}^{\infty} j x^j$

$$P_{min} = f\left(\frac{1}{1.05}\right)$$

$$g(x) = \sum_{m=0}^{\infty} x^m = \frac{1}{1-x} \quad \text{if } |x|<1$$

$$\left(\frac{1}{1-x}\right)' = \frac{1}{(1-x)^2} = \sum_{j=1}^{\infty} j x^{j-1} = x^{-1} f(x)$$

$$f(x) = \frac{x}{(1-x)^2}$$

$$f\left(\frac{20}{21}\right) = \frac{\frac{20}{21}}{\left(1-\frac{20}{21}\right)^2} = \frac{20}{21\left(\frac{1}{21}\right)^2} = 20\cdot 21 = 420$$

8) a) compare w. $\frac{n^2}{n^{2.5}} = \frac{1}{n^{.5}}$ $\lim_{n\to\infty} \frac{n^2}{\sqrt{n^5+1}} \Big/ \frac{1}{n^{.5}} = 1$

Cp same, $q = \lim_{n\to\infty} \left(\frac{n^{1/2}}{(1+n)^{1/2}}\right) = 1$

b)