Math 1B
Group Quiz 1
Tue Jan 15, 2008

Names: WHITE

[10 POINTS] Find the area under the curve $f(x) = 3x^2 + 2x$ from x = 1 to x = 4 using the limit of the right handed sums.

$$\Delta x = \frac{4-1}{n} = \frac{3}{n} \quad 1$$

$$x_i = 1 + \frac{3i}{n} \quad 1$$

$$A = \lim_{n\to\infty} \sum_{i=1}^{n} f\left(1+\frac{3i}{n}\right)\left(\frac{3}{n}\right) \quad 1$$

$$= \lim_{n\to\infty} \sum_{i=1}^{n} \left[3\left(1+\frac{3i}{n}\right)^2 + 2\left(1+\frac{3i}{n}\right)\right]\frac{3}{n} \quad 1$$

$$= \lim_{n\to\infty} \frac{3}{n} \sum_{i=1}^{n} \left(3 + \frac{18i}{n} + \frac{27i^2}{n^2} + 2 + \frac{6i}{n}\right)$$

$$= \lim_{n\to\infty} \frac{3}{n} \sum_{i=1}^{n} \left(5 + \frac{24i}{n} + \frac{27i^2}{n^2}\right) \quad 1\tfrac{1}{2}$$

$$= \lim_{n\to\infty} \frac{3}{n} \left(5n + \frac{\cancel{24}^{\,12}}{\cancel{n}}\frac{\cancel{n}(n+1)}{\cancel{2}} + \frac{\cancel{27}^{\,9}}{n^{\cancel{2}}}\frac{\cancel{n}(n+1)(2n+1)}{\cancel{6}_{\,2}}\right) \quad \tfrac{1}{2} \quad \tfrac{1}{2} \quad \tfrac{1}{2}$$

$$= \lim_{n\to\infty} \frac{3}{n} \left(5n + 12(n+1) + \frac{9}{2n}(n+1)(2n+1)\right)$$

$$= \lim_{n\to\infty} \frac{3}{2n^2} \left(10n^2 + 24n(n+1) + 9(n+1)(2n+1)\right)$$

$$= \lim_{n\to\infty} \frac{3}{2n^2} \left(52n^2 + 51n + 9\right) \quad 1 \quad 1$$

$$= \frac{3 \cdot \cancel{52}\,26}{\cancel{2}}$$

$$= 78 \quad 1$$