Math 1B
Quiz 1
Fri Apr 11, 2008

What day of the month is your birthday ? ___ ___
What are the last 2 digits of your address ? ___ ___
What are the last 2 digits of your zip code ? ___ ___

[5 POINTS] Use summation rules/shortcuts to compute the sum $\sum_{i=1}^{20}(i-2i^2)$. **You must show the rules/shortcuts being used.**

$$= \sum_{i=1}^{20} i - 2\sum_{i=1}^{20} i^2$$

$$= \frac{20\cdot 21}{2} - 2\,\frac{20\cdot 21\cdot 41}{6}$$

$$= 210 - 5740$$

$$= -5530$$

1 POINT EACH

[5 POINTS] Compute the sum $\sum_{i=1}^{n}\frac{1}{n}\left[2\left(\frac{i}{n}\right)^2+\left(\frac{i}{n}\right)\right]$, and ALSO compute the limit of the sum as $n\to\infty$. **Show your work.**

$$= \sum_{i=1}^{n}\left(\frac{2i^2}{n^3}+\frac{i}{n^2}\right)$$

$$= \frac{2}{n^3}\sum_{i=1}^{n} i^2 + \frac{1}{n^2}\sum_{i=1}^{n} i$$

$$= \frac{2}{n^3}\,\frac{n(n+1)(2n+1)}{6} + \frac{1}{n^2}\,\frac{n(n+1)}{2}$$

$$= \frac{(n+1)(2n+1)}{3n^2} + \frac{n+1}{2n}$$

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

$$= \frac{(n+1)[2(2n+1)+3n]}{6n^2}$$

$$= \frac{(n+1)(7n+2)}{6n^2}$$

$$= \frac{7n^2+9n+2}{6n^2}$$

$$\lim_{n\to\infty}\frac{7n^2+9n+2}{6n^2} = \frac{7}{6}$$

1 POINT EACH

[QUESTIONS ON THE OTHER SIDE]

[8 POINTS] Use summation rules/shortcuts to compute the sum $\sum_{i=1}^{n} f(x_i)\Delta x$ where

$$f(x) = 4x^2 + 2, \qquad x = 2.1, 2.2, 2.3, \ldots, 3.0, \qquad \Delta x = 0.1, \qquad n = 10.$$

You must show the rules/shortcuts being used. YOU WILL ONLY RECEIVE 1 POINT IF YOU SIMPLY LIST THE TERMS AND ADD THEM WITHOUT USING THE RULES/SHORTCUTS.

$$\sum_{i=1}^{10} f\left(2 + \frac{1}{10}i\right)\frac{1}{10}$$

$$= \sum_{i=1}^{10} \left(4\left(2 + \frac{1}{10}i\right)^2 + 2\right)\frac{1}{10}$$

$$= \sum_{i=1}^{10} \left(16 + \frac{8}{5}i + \frac{1}{25}i^2 + 2\right)\frac{1}{10}$$

$$= \frac{1}{10}\sum_{i=1}^{10} \left(18 + \frac{8}{5}i + \frac{1}{25}i^2\right)$$

$$= \frac{1}{10}\left(10 \cdot 18 + \frac{8}{5} \cdot \frac{10(11)}{2} + \frac{1}{25}\cdot\frac{10(11)(21)}{6}\right)$$

$$= 18 + \frac{44}{5} + \frac{77}{50}$$

$$= 28.34$$

1 POINT EACH

[2 POINTS] **MULTIPLE CHOICE (NO PARTIAL CREDIT)**

The table shows the velocity of an object at various times. Estimate the distance traveled using the method discussed in class.

Time (s)	0	0.5	1.0	1.5	2.0	2.5
Velocity (ft/s)	80	90	86	84	78	76

[A] 187 feet [B] 208 feet [C] 184 feet
[D] 205 feet [E] 193 feet [F] 211 feet

LETTER OF CORRECT ANSWER: B

2 POINTS

[2 BONUS POINTS] If $\sum_{i=c}^{50} (2i + 3) = 2220$, find the value of c.

YOU MAY USE ANY METHOD EXCEPT GUESS AND CHECK.