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 $\sum_{i=1}^{20}(2i-i^2)$. **You must show the rules/shortcuts being used.**

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

$$= 2\left(\frac{20\cdot 21}{2}\right) - \frac{20(21)(41)}{6}$$

$$= 420 - 2870$$

$$= -2450$$

1 POINT EACH

[5 POINTS] Compute the sum $\sum_{i=1}^{n}\frac{1}{n}\left[3\left(\frac{i}{n}\right)^2+\left(\frac{i}{n}\right)\right]$, and ALSO compute the limit of the sum as $n\to\infty$. **Show your work.**

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

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

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

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

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

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

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

$$= \frac{3n^2+4n+1}{2n^2}$$

$$\lim_{n\to\infty}\frac{3n^2+4n+1}{2n^2} = \frac{3}{2}$$

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.

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

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

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

$$= \frac{1}{10}\sum_{i=1}^{10}\left(14+1.6i+0.04i^2\right)$$

$$= \frac{1}{10}\left(10(14)+1.6\,\frac{10(11)}{2}+0.04\,\frac{10(11)(21)}{6}\right)$$

$$= 14 + 8.8 + 1.54$$

$$= 24.34$$

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	92	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: F

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.