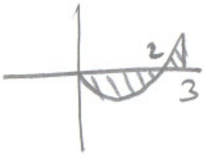
Math 1B (7:30am – 8:20am)
Group Quiz 2
Wed Oct 7, 2009

Group Members' Names:
[Use the name you asked to be called]

SCORE: ___ / 10 POINTS

Find the area between the graph of $f(x) = x^2 - 2x$ and the x-axis on $[0, 3]$. Simplify your answer. SCORE: ___ / 3 POINTS



$$-\int_0^2 (x^2-2x)\,dx + \int_2^3 (x^2-2x)\,dx \quad 1$$

$$= -\left(\tfrac{1}{3}x^3 - x^2\right)\Big|_0^2 + \left(\tfrac{1}{3}x^3 - x^2\right)\Big|_2^3$$

1

$$= -\left(\left(\tfrac{8}{3}-4\right) - (0-0)\right) + \left((9-9) - \left(\tfrac{8}{3}-4\right)\right) \quad \tfrac{1}{2}$$

OR SIMILAR

$$= \frac{8}{3} \quad \tfrac{1}{2}$$

Identify the following limit as a Riemann sum, and evaluate the limit. Show all algebraic reasoning. SCORE: ___ / 3 POINTS

$$\lim_{n\to\infty} \frac{5}{n}\left[\frac{1}{\sqrt{4+\frac{5}{n}}} + \frac{1}{\sqrt{4+\frac{10}{n}}} + \cdots + \frac{1}{3}\right] = \lim_{n\to\infty} \sum_{i=1}^{n} \frac{1}{\sqrt{4+\frac{5i}{n}}}\frac{5}{n} = \lim_{n\to\infty} \sum_{i=1}^{n} f(x_i)\Delta x$$

$$\Delta x = \frac{5}{n} = \frac{b-a}{n} \Rightarrow b-a=5$$

$$f(x_i) = f(a+i\Delta x) = \frac{1}{\sqrt{4+\frac{5i}{n}}}$$

$$f\left(a+\frac{5i}{n}\right) = \frac{1}{\sqrt{4+\frac{5i}{n}}} \Rightarrow a=4,\ b=9$$

$$f\left(4+\frac{5i}{n}\right) = \frac{1}{\sqrt{4+\frac{5i}{n}}} \Rightarrow f(x) = \frac{1}{\sqrt{x}}$$

$$\int_4^9 \frac{1}{\sqrt{x}}\,dx = 2x^{\frac{1}{2}}\Big|_4^9 = 2\sqrt{9} - 2\sqrt{4} = 2$$

Find the average value of $f(x) = \left(x^{\frac{2}{3}} - 2x^{\frac{1}{3}}\right)^2$ on $[0, 1]$. Simplify your answer. SCORE: ___ / 4 POINTS

$$\frac{1}{1-0}\int_0^1 \left(x^{2/3} - 2x^{1/3}\right)^2 dx \quad 1$$

$$= \int_0^1 \left(x^{4/3} - 4x + 4x^{2/3}\right) dx \quad 1$$

$$= \frac{3}{7}x^{\frac{7}{3}} - 2x^2 + \frac{12}{5}x^{5/3}\Big|_0^1 \quad 1$$

$$= \left(\frac{3}{7} - 2 + \frac{12}{5}\right) - (0 - 0 + 0) = \frac{15-70+84}{35} = \frac{29}{35}$$

$\tfrac{1}{2}$ $\tfrac{1}{2}$