

Exam 4 Calc 1 11/30/2007

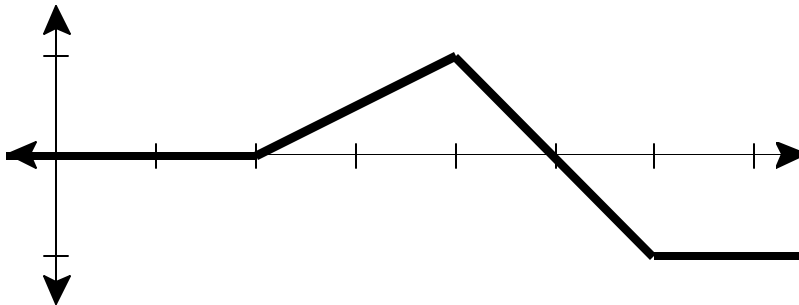
Each problem is worth 10 points. For full credit provide complete justification for your answers.

1. Find L_3 , the left-hand Riemann sum with 3 subdivisions, for $\int_0^3 (2x^2 + 3x + 2) dx$.

2. For the function $f(x)$ whose graph is shown below, find

a) $\int_2^5 f(x) dx$

b) $\int_2^7 f(x) dx$



3. Evaluate $\int \left(e^x + 2 - 6x^2 + \frac{1}{\sqrt{x}} + \sin x \right) dx$.

4. a) Evaluate $\int_{-5}^5 (4 - |x|) dx$ [Hint: Interpret it graphically].

b) Evaluate $\int_{-3}^3 \sqrt{9 - x^2} dx$ [Hint: Interpret it graphically].

5. Evaluate $\int \frac{5x}{x^2 + 1} dx$.

6. Write an expression in sigma notation for R_n for $\int_1^3 (9 - x^2) dx$.

7. Evaluate $\lim_{n \rightarrow \infty} \sum_{i=1}^n \left(3 + \frac{i}{n} \right) \left(\frac{1}{n} \right)$.

8. Biff is a calculus student at Enormous State University, and he's having some trouble. Biff says "Well, crap. I got our quiz back today in our discussion section and the idiots gave me zero points on this one question, and then the T.A. was saying there'd be a question like that on the exam tomorrow. But the thing is, they didn't even mark what I did wrong, so if I can't fix that step I got no clue what to do. Here, look at this BS!"

Biff's quiz is shown below. Help Biff understand what he did wrong, and how he might have answered differently.

2) Use the Fundamental Theorem of Calculus to evaluate $\int_{-2}^3 1/x^2 dx$, if appropriate.

0/5 $\int_{-2}^3 \frac{1}{x^2} dx = \left[-\frac{1}{x} \right]_{-2}^3 = \left(-\frac{1}{3} \right) - \left(\frac{1}{2} \right) = -\frac{5}{6}$

9. Find the area of the region bounded between the graphs of $y = 8x$ and $y = x^3$.

10. Show that for any continuous function $f(x)$, $\int_0^b f(x) dx = \int_{-b}^0 f(-x) dx$.

Extra Credit (5 points possible):

Evaluate $\lim_{n \rightarrow \infty} \frac{1}{n} \left(\sqrt{\frac{1}{n}} + \sqrt{\frac{2}{n}} + \sqrt{\frac{3}{n}} + \dots + 1 \right)$.