Calculus II (157–01)

Second Exam

Spring 2012

Please do all work on this paper. Points are written to the left of each problem,

9 pts 1. Let $f(x) = \sin(x^2)$. When the interval $[0, \sqrt{\pi/2}\,]$ is divided into 10 equal parts, the left hand and right hand approximations to

$$\int_0^{\sqrt{\pi/2}} \sin(x^2)\,dx$$

are respectively $L_{10}(f) \approx .4866$ and $R_{10}(f) \approx .6120$.

(a) Notice that $\sin(x^2)$ is increasing on the interval $[0, \sqrt{\pi/2}\,]$. What does the information about $L_{10}(f)$ and $R_{10}(f)$ tell you about

$$\int_0^{\sqrt{\pi/2}} \sin(x^2)\,dx\,?$$

(b) Find the trapezoidal approximation $T_{10}(f)$.

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91 pts 2. Evaluate the following integrals.

(a) $\displaystyle\int \frac{3x^2 + 2x - 3}{x + 2}\,dx$

(b) $\int_0^1 \sinh x \, dx$

(c) $\int x^3 \ln x \, dx$

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(d) $\int_0^1 x^3 \ln x \, dx$

(e) $\int \sin^3 x \, dx$

(f) $\displaystyle\int \frac{x^3}{\sqrt{1-x^2}}\,dx$ (Hint: you may find one of the integrals from page 2 useful.)

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(g) $\displaystyle\int \frac{3x^2-2x+1}{(x-1)(x^2+1)}\,dx.$