Math 106, Sect. 350 — Answers to Quiz # 10 — 16 Nov '06

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1. Use the Fundamental Theorem of Calculus to evaluate the integral: $\displaystyle\int_0^1 \left(\frac{x+2}{\sqrt{x}} + e^{3x}\right) dx$

   Solution. First, we simplify the integrand:

   $$\frac{x+2}{\sqrt{x}} + e^{3x} = x^{1/2} + 2x^{-1/2} + e^{3x}.$$

   One antiderivative of this is $\frac{2}{3}x^{3/2} + 4x^{1/2} + \frac{1}{3}e^{3x}$. Thus

   $$\begin{aligned}\int_0^1 \left(\frac{x+2}{\sqrt{x}} + e^{3x}\right) dx &= \frac{2}{3}x^{3/2} + 4x^{1/2} + \frac{1}{3}e^{3x}\Big|_0^1 \\ &= \left(\frac{2}{3} + 4 + \frac{e^3}{3}\right) - \left(0 + 0 + \frac{1}{3}\right) \\ &= \frac{13+e^3}{3}\end{aligned}$$

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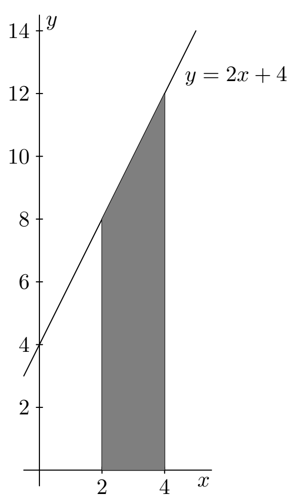
2. Graph the following integrand and use area to evaluate the integral: $\displaystyle\int_2^4 (2x+4)\, dx$ (NO credit for using other methods!)

   Solution.



   Splitting the region into two parts, a rectangle of base 2 and height 8, and a triangle of base 2 and height 4, we have a total area of $2 \cdot 8 + \frac{2 \cdot 4}{2} = 16 + 4 = 20$.