EMT111 Integration Problem Set

November 19, 2010

1. Evaluate.

   (a) $\displaystyle\int x(x^2+2)\,dx$

   (b) $\displaystyle\int_1^4 \sqrt{4x}\,dx$

   (c) $\displaystyle\int \left(x+\frac{1}{x}\right)^2 dx$

   (d) $\displaystyle\int x^2 \sin x\,dx$

   (e) $\displaystyle\int \frac{\sin(1-4x)}{3}\,dx$

   (f) $\displaystyle\int \frac{dx}{5x-3}$

   (g) $\displaystyle\int \frac{dx}{x^2\sqrt{x^2-9}}$

   (h) $\displaystyle\int \frac{x^3}{\sqrt{x^2+9}}\,dx$

   (i) $\displaystyle\int x^3\sqrt{4-x^2}\,dx$

   (j) $\displaystyle\int_0^{2\sqrt{3}} \frac{x^3}{\sqrt{16-x^2}}\,dx$

   (k) $\displaystyle\int_0^1 \sqrt{x^2+1}\,dx$

   (l) $\displaystyle\int \frac{dx}{(x^2+2x+2)^2}$

   (m) $\displaystyle\int x^5 e^{x^2}\,dx$

   (n) $\displaystyle\int e^{(\ln x + x^2)}\,dx$

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

   (p) $\displaystyle\int x\ln x\,dx$

2. Evaluate.

   (a) $\displaystyle\int \frac{\sin 2x}{1+\cos^2 x}\,dx$

   (b) $\displaystyle\int \sin^3 x \cos^3 x\,dx$

   (c) $\displaystyle\int \sin^6 x \cos^3 x\,dx$

   (d) $\displaystyle\int_0^{\frac{\pi}{4}} \sin^4 x \cos^2 x\,dx$

   (e) $\displaystyle\int \tan^3 x \sec x\,dx$

   (f) $\displaystyle\int \sin^5 x\,dx$

   (g) $\displaystyle\int \sin 3x \sin 6x\,dx$

   (h) $\displaystyle\int \frac{\tan^3\theta}{\cos^4\theta}\,d\theta$

3. Consider the region R, in the first quadrant, bounded above by $y = 3x$ and below by $y = x^2$.

   (a) Find the area of R.

   (b) Find the volume of the solid that is obtained by rotating R about the y-axis.

   (c) Find the volume of the solid that is obtained by rotating R about the x-axis.