Math 12 | Department of Mathematics | Spring 1998

Exam 2 Review

You may use that

$$\int \sqrt{2au-u^2}du = \frac{u-a}{2}\sqrt{2au-u^2} + \frac{a^2}{2}\cos^{-1}\left(\frac{a-u}{a}\right) + C$$

$$\int u\sqrt{2au-u^2}du = \frac{2u^2-au-3a^2}{6}\sqrt{2au-u^2} + \frac{a^3}{2}\cos^{-1}\left(\frac{a-u}{a}\right) + C$$

$$\int \frac{\sqrt{2au-u^2}}{u}du = \sqrt{2au-u^2} + a\cos^{-1}\left(\frac{a-u}{a}\right) + C$$

$$\int \frac{\sqrt{2au-u^2}}{u^2}du = -\frac{2\sqrt{2au-u^2}}{u} - \cos^{-1}\left(\frac{a-u}{a}\right) + C$$

1. Set up the form of the partial fraction decomposition. DO NOT EVALUATE the coefficients:

   (a) $\dfrac{5}{x^2(x^2-16)(x^2+x+6)}$ (b) $\dfrac{x^2+12}{x^2(x-2)(x+2)(x^2+4)}$ (c) $\dfrac{x^4-6}{(x-1)(x^2+x+1)^2}$

2. Evaluate each integral in problems a - z.

(a) $\int_1^2 x^3 \ln x\, dx$ (b) $\int \tan^{-1} x\, dx$ (c) $\int \sin^3 2x\, dx$

(d) $\int \frac{dx}{(1-x^2)^{\frac{3}{2}}}$ (e) $\int \frac{x^2+2}{x^2-1}dx$ (f) $\int \cos^2(\frac{x}{4})dx$

(g) $\int \frac{dx}{x^2\sqrt{1+x^2}}$ (h) $\int \frac{4x^5-16x^4+17x^3+x^2-4x+8}{x^4-4x^3+4x^2}dx$

(i) $\int \frac{4x^7-16x^6+57x^5-154x^4+145x^3+64x^2-36x+72}{(x^4-4x^3+4x^2)(x^2+9)}$

(j) $\int \frac{8x^3+13x^2+4x+10}{(4x^3+4x^2+10x)^2}$ (k) $\int\int \frac{\sqrt{\ln x-(\ln(x^2))^2}dx}{x}$ (l) $\int \frac{\sqrt{x+4}}{x}dx$

(m) $\int \frac{\tan\theta}{\sec^4\theta}d\theta$ (n) $\int_1^4 e^{\sqrt{x}}dx$ (o) $\int_1^4 \sqrt{t}\ln\sqrt{t}\, dt$

(p) $\int_{-\pi}^{\pi} \cos 3x \cos 17x\, dx$ (q) $\int \frac{e^{\sqrt{x}}}{\sqrt{x}}dx$ (r) $\int \frac{\sec^2\theta}{1-\tan\theta}d\theta$

(s) $\int \frac{x^2+4}{x-1} dx$

(t) $\int \frac{\ln(\ln x)}{x} dx$

(u) $\int \frac{\sin\theta}{1+\sin\theta} d\theta$

(v) $\int e^{-t} \sinh t \, dt$

(w) $\int_0^{\frac{\pi}{4}} \cos^5(2\theta) d\theta$

(x) $\int (\sin^{-1}(x))^2 \, dx$

(y) $\int \frac{\tan^{-1} x}{x^2} dx$

(z) $\int \frac{\sec^2\theta}{1-\tan\theta} d\theta$