SOLUTIONS FOR HOMEWORK PROBLEMS 17.3

MATH 132 - WI00

For the problems which are identical to table version I'll just indicate the index of the formula in the table (mind the fact that the Table I'm using is **Appendix C in your coursebook, page A38 -** the one just before the solutions).

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Formula 8, with $a = 1$ and $b = 2$.

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Formula 4, with $a = 2$ and $b = 5$.

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$\frac{\sqrt{4x^2+1}}{x^2} = \frac{\sqrt{4}\sqrt{x^2+\frac{1}{4}}}{x^2} = 2\frac{\sqrt{x^2+\frac{1}{4}}}{x^2}$ ... and now use Formula 26, with $a^2 = \frac{1}{4}$ - the 2 is just a constant you can pull in front of the integral:

$$\int 2\frac{\sqrt{x^2+\frac{1}{4}}}{x^2}\,dx = 2\int \frac{\sqrt{x^2+\frac{1}{4}}}{x^2}\,dx$$

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$x^2\sqrt{2x^2-9} = x^2\sqrt{2}\sqrt{x^2-\frac{9}{2}} = \sqrt{2}(x^2\sqrt{x^2-\frac{9}{2}})$ and now use Formula 24, with $a^2 = \frac{9}{2}$ - the $\sqrt{2}$ is just a constant you can pull in front of the integral:

$$\int \sqrt{2}(x^2\sqrt{x^2-\frac{9}{2}})\,dx = \sqrt{2}\int (x^2\sqrt{x^2-\frac{9}{2}})\,dx$$

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$\frac{1}{x^2\sqrt{9-4x^2}} = \frac{1}{x^2\sqrt{4}\sqrt{\frac{9}{4}-x^2}} = \frac{1}{\sqrt{4}}\frac{1}{x^2\sqrt{\frac{9}{4}-x^2}} = \frac{1}{2}\frac{1}{x^2\sqrt{\frac{9}{4}-x^2}}$ and use Formula 21 with $a^2 = \frac{9}{4}$ - the 1 $over2$ is just a constant you can pull in front of the integral:

$$\int \frac{1}{2}\frac{1}{x^2\sqrt{\frac{9}{4}-x^2}}\,dx = \frac{1}{2}\int \frac{1}{x^2\sqrt{\frac{9}{4}-x^2}}\,dx$$

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Here it'll be just regular substitution, namely $u = e^{2x} + 3 \to du = e^{2x}(2x)'\,dx = 2e^{2x}\,dx \to dx = \frac{du}{2e^{2x}}$ and so on. Don't forget that denominator means negative power, and square root means $\frac{1}{2}$ power (so in the end you'll have $u^{-\frac{1}{2}}$) ...

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Formula 13, with $a = 1$ and $b = 2$. Don't forget to plug in values at the end, as this is a DEFINITE integral ...

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Use the properties of ln first: $\ln 2x = \ln 2 + \ln x$, so our integral becomes:

$$\int_1^2 x \ln(2x)\, dx = \int_1^2 x(\ln 2 + \ln x)\, dx = \int_1^2 x \ln 2\, dx + \int_1^2 x \ln x\, dx.$$

Since $\ln 2$ is just a constant, the first term is just $\ln 2 * \int_1^2 x\, dx$; as for the second term, use formula 42, with $n = 1$ (n is the power of x, and for our problem it is 1).

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