Домашня робота 2

2.6 a) $\int x^2 \sin x \ \mathbf{d}x = |u = x^2;\ v = -\cos x| = -x^2 \cos x + 2\int x \cos x \ \mathbf{d}x =$
$= |u = x;\ v = \sin x| = -x^2 \cos x + 2x \sin x - 2\int \sin x \ \mathbf{d}x =$
$= -x^2 \cos x + 2x \sin x + 2\cos x + c$

b) $\int x \operatorname{sh} x \ \mathbf{d}x = |u = x;\ v = \operatorname{ch} x| = x \operatorname{ch} x - \int \operatorname{ch} x \ \mathbf{d}x = x \operatorname{ch} x - \operatorname{sh} x + c$

c) $\int x^2 e^{-2x} \ \mathbf{d}x = |u = x^2;\ v = -\frac{1}{2}e^{-2x}| = -\frac{1}{2}x^2 e^{-2x} + \int e^{-2x} x \ \mathbf{d}x =$
$= -\frac{1}{2}x^2 e^{-2x} - \frac{1}{2}x e^{-2x} - \frac{1}{4}e^{-2x} + c$

2.7 a) $\int \arcsin x \ \mathbf{d}x = |u = \arcsin x;\ v = x| = x \arcsin x - \int \frac{x}{\sqrt{1-x^2}} \ \mathbf{d}x =$
$= x \arcsin x + \frac{1}{2}\int \frac{1}{\sqrt{1-x^2}} \ \mathbf{d}(1-x^2) = x \arcsin x + \sqrt{1-x^2}$

b) $\int x \arctan x \ \mathbf{d}x = |u = \arctan;\ v = \frac{x^2}{2}| = \frac{1}{2}x^2 \arctan x - \frac{1}{2}\int \frac{x^2}{x^2+1} \ \mathbf{d}x =$
$= \frac{1}{2}x^2 \arctan x - \frac{1}{2}\int \left(1 - \frac{1}{x^2+1}\right) \ \mathbf{d}x = \frac{1}{2}x^2 \arctan x + \frac{1}{2}\arctan x - \frac{x}{2} + c$

c) $\int (\frac{\ln x}{x})^2 \ \mathbf{d}x = |u = \ln^2 x;\ v = -\frac{1}{x}| = -\frac{\ln^2}{x} + 2\int \frac{\ln x}{x^2} \ \mathbf{d}x = |u = \ln x;\ v = -\frac{1}{x}| =$
$= -\frac{\ln^2 x}{x} - \frac{2\ln x}{x} + 2\frac{1}{x^2} \ \mathbf{d}x = -\frac{\ln^2 x}{x} - \frac{2\ln x}{x} - \frac{2}{x}$

2.8 a) $\int \sin(\ln x) \ \mathbf{d}x = \int e^{\ln x} \sin(\ln x) \ \mathbf{d}(\ln x) = \frac{1}{2}x(\sin(\ln x) - \cos(\ln x)) + c$

b) $\int e^{2x} \sin^2 x = \frac{1}{4}\int e^{2x}(1 - \cos 2x) \ \mathbf{d}(2x) = -\frac{1}{4}\int e^{2x} \cos 2x \ \mathbf{d}(2x) + \frac{1}{4}\int e^{2x} \ \mathbf{d}(2x) =$
$= \frac{e^{2x}}{4} - \frac{e^{2x}}{8}(\sin 2x + \cos 2x) + c$