Double your money back guarantee! If your answer is scored wrong and you can demonstrate that the integral can be done successfully using your method you get a two point bonus. **Note:** In all cases the integral contains an arbitrary constant of integration, which I did not bother writing.

Problem 1: If you were to attempt to do the following integral

$$I = \int \sin^3(2x)\cos^2(2x)dx$$

via a substitution, what substitution would you make?

a $u = \sin^3(2x)$

b $u = \sin(2x)\cos(2x)$

c $u = \cos^2(2x)$

d $u = \sin(2x)$

e $u = \cos(2x)$

Problem 2: Compute the following integral

$$I = \int \sin^3(2x)\cos^2(2x)dx$$

a $I = \frac{1}{2}\left(\frac{\sin^5(2x)}{5} - \frac{\sin^3(2x)}{3}\right)$

b $I = \frac{1}{4}\left(\frac{\cos^6(2x)}{6} - \frac{\cos^4(2x)}{4}\right)$

c $I = \frac{1}{2}\left(\frac{\cos^5(2x)}{5} - \frac{\cos^3(2x)}{3}\right)$

d $I = \frac{1}{4}\left(\frac{\sin^5(2x)}{5} - \frac{\sin^3(2x)}{3}\right)$

e $I = \frac{1}{3}\left(\frac{\sin^4(2x)}{4} - \frac{\sin^2(2x)}{2}\right)$

Problem 3: Compute the following integral

$$I = \int \tan^3(2x) dx.$$

a $u = -\ln|\sec(2x) + \tan(2x)| + 2\sec(2x)$

b $u = \ln|\sec(2x) + \tan(2x)| + \sec(2x)$

c $u = \frac{\tan^4(2x)}{8}$

d $u = \frac{\sec^2(2x)}{4} - \frac{\ln|\sec(2x)|}{2}$

e $u = \frac{\sec^2(2x)}{2} - \frac{\ln|\sec(2x)|}{2}$

Problem 4: What substitution is your best bet for calculating the following integral

$$I = \int \frac{dx}{x^2\sqrt{x^2 - 1}}$$

a $x = 3\tan(u)$

b $x = \sec(u)$

c $x = \tan(u)$

d $x = 3\sec(u)$

e $x = \sin(u)$

Problem 5: Evaluate the integral

$$I = \int \frac{dx}{x^2\sqrt{x^2-1}}$$

a $I = \operatorname{arcsec}(x)$

b $I = x\arcsin(x) - \sqrt{x^2-1}$

c $I = \frac{x}{\sqrt{x^2-1}}$

d $I = \frac{\sqrt{x^2-1}}{x}$

e $I = \frac{1}{x\sqrt{x^2-1}}$

Problem 6: Suppose that you make the change of variables

$$u = 4\sec(x)$$

Express the quantity

$$\sin(x)$$

in terms of u

a $\sin(x) = \frac{u}{\sqrt{u^2-16}}$

b $\sin(x) = \frac{\sqrt{u^2-4}}{u}$

c $\sin(x) = \frac{\sqrt{u^2-1}}{u}$

d $\sin(x) = \frac{\sqrt{u^2-16}}{u}$

e $\sin(x) = \frac{4}{u}$