Math 142 Sample Exam 2

Here are some sample integrals to compute. The actual exam will probably consist of about 5 or 6 integrals of different types and maybe another problem. Know method of substitution, integration by parts, trig integrals, trig substitution, and (easy) partial fractions. Also remember derivatives of exponential, logarithmic, and inverse trigonometric functions.

**Question 1**

a) \[ \int \frac{e^{2x}}{1 - e^{2x}} \, dx \]

b) \[ \int_1^2 \frac{e^{1/x}}{x^2} \, dx \]

c) \[ \int \frac{4x}{\sqrt{x^4 + 1}} \, dx \]

d) \[ \int x e^{2-x} \, dx \]

e) \[ \int \frac{x - 8}{\sqrt{x^2 + 4x}} \, dx \]

f) \[ \int \frac{1 - 3x^2}{x(x^2 - 1)} \, dx \]

g) \[ \int_1^e \frac{x[1 + (\ln x)^2]}{x - 2} \, dx \]

h) \[ \int \frac{2\sin x \cos x}{(\sin x - 2)^2} \, dx \]

i) \[ \int \frac{3}{\sqrt{x^2 - 4x + 2}} \, dx \]

j) \[ \int e^{3x} \cos 5x \, dx \]

k) \[ \int \frac{3}{\sqrt{x^2 - 10x + 25}} \, dx \]

l) \[ \int \frac{x}{\sqrt{6 - 4x - 2x^2}} \, dx \]

m) \[ \int \sin^5 3x \, dx \]

n) \[ \int x^5 \ln x \, dx \]

**Question 2** Find the volume of the solid of revolution gotten by revolving the graph of \( y = \tan^2 x \) about the \( x \)-axis from \( x = 0 \) to \( x = \pi/4 \).