Quiz 1 Questions

Problem 1. (Upload Work) Evaluate the following integrals:

(a : 7 points) $\displaystyle\int_1^e x^2 \ln x \, dx$

(b : 7 points) $\displaystyle\int \ln \sqrt{x} \, dx$

Problem 2. (Upload Work) Evaluate the following integrals:

(a : 7 points) $\displaystyle\int_0^{\pi/2} \cos^3(x) \sin^{2026}(x) \, dx$

(b : 7 points) $\displaystyle\int (1 + \sin(2x))^2 \, dx$

Problem 3. (12 points : Upload Work) Evaluate the integral $\displaystyle\int \frac{1}{1-x^2} \, dx$.

Problem 4. (5 points : Canvas) What integration technique would you use to evaluate $\displaystyle\int \frac{x^3}{\sqrt{1-x^2}} \, dx$? Explain your reasoning or provide the first few steps if you are unsure on what to write.

Problem 5. True or False (Canvas)

(a) : $\Big($T / F$\Big)$ Integration-By-Parts works by identifying a chain-rule and undoing it.

(b) : $\Big($T / F$\Big)$ If $2\sec\theta = x$ then $\sin\theta = \dfrac{x}{\sqrt{x^2-2}}$

(c) : $\Big($T / F$\Big)$ If $\sin\theta = \dfrac{x}{2}$ then $\sin(2\theta) = \dfrac{x^2}{\sqrt{4-x^2}}$

List of Given Information

1. Pythagorean Identities
   (a) $\sin^2(x) + \cos^2(x) = 1$
   (b) $\tan^2(x) + 1 = \sec^2(x)$
   (c) $1 + \cot^2(x) = \csc^2(x)$
2. Double Angle Identities
   (a) $\sin(2x) = 2\sin x \cos x$
   (b) $cos(2x) = \cos^2(x) - \sin^2(x)$
3. Half-Angle Identities
   (a) $\sin^2(x) = \dfrac{1 - \cos(2x)}{2}$
   (b) $\cos^2(x) = \dfrac{1 + \cos(2x)}{2}$
4. Trig-Integrals
   (a) $\displaystyle\int \sec x \, dx = \ln|\sec x + \tan x| + C$
   (b) $\displaystyle\int \tan x \, dx = \ln|\sec x| + C$
   (c) $\displaystyle\int \csc x \, dx = \ln|\csc x + \cot x| + C$
   (d) $\displaystyle\int \cot x \, dx = \ln|\csc x| + C$