Problem 1: Evaluate the definite integral
\[ \int_{0}^{\pi/4} \cos(2x) \, dx \]

Problem 2: Evaluate the indefinite integral using integration by parts:
\[ \int x \sin(x) \, dx \]

Problem 3: Evaluate the indefinite integral \((n \neq -1)\)
\[ \int y^n \, dy \]

Problem 4: Evaluate the definite integral
\[ \int_{1}^{2} x^3 + \frac{1}{x} \, dx \]

Problem 5: In the following sentences cross out the WRONG word:
The integral \( \int_{0}^{\infty} x \, dx \) is proper. improper.
The integral \( \int_{0}^{4} (x - 3)^2 \, dx \) is proper. improper.
The integral \( \int_{0}^{\infty} \frac{1}{x} \, dx \) is improper and convergent. divergent.
The integral \( \int_{0}^{\infty} \frac{1}{x^2} \, dx \) is improper and convergent. divergent.
Problem 6: Write out the partial fractions expansion of the function

\[
\frac{10}{2x^2 + 3x - 2}
\]

Problem 7: Write out the partial fractions expansion of the function

\[
\frac{10}{(x^2 + 9)(x - 1)}
\]

Problem 8: Evaluate the indefinite integral:

\[
\int \frac{10}{(x^2 + 9)(x - 1)} \, dx
\]

Problem 9: Evaluate the indefinite integral:

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

Problem 10: Use Simpson’s rule to approximate the given integral:

\[
\int_1^3 2^x \, dx
\]