Caculus Review

1. \( \int x^2 e^{-3x} \, dx \)

   Integrate by parts twice, and will get \(-\frac{1}{27} e^{-3x} (2 + 6x + 9x^2) + C\).

2. \( \int \frac{\ln x}{x} \, dx \)

   Substitution: \( u = \ln x, \, du = \frac{1}{x} \, dx \).

   The answer is \( \frac{1}{2} (\ln x)^2 + C \).

3. \( \int \frac{3x + 2}{x^2 + x} \, dx \)

   Partial fraction decomposition.

   The answer is \( 2 \ln |x| + \ln |1 + x| + C \).

4. \( \int e^x \cos x \, dx \)

   Integration by parts.

   The answer is \( \frac{1}{2} e^x (\cos x + \sin x) + C \).

5. \( \int \frac{x^2 - 4x + 1}{(x^2 + 1)(x - 1)^2} \, dx \)

   Integration by parts.

   The answer is \( \frac{1}{1+x} + 2 \arctan x + C \).