Math 1142 Quiz 8 Solutions

1. (5 points) Determine \( \int -2(e^{2x} + 1) \, dx \).

Solution: By the constant-multiple rule, we can pull the \(-2\) outside of the integral sign:

\[
\int -2(e^{2x} + 1) \, dx = -2 \int e^{2x} + 1 \, dx
\]

Now we use the fact that the integral of a sum is the sum of the integrals:

\[
-2 \int e^{2x} + 1 \, dx = -2 \left[ \int e^{2x} \, dx + \int 1 \, dx \right]
\]

\[
= -2 \left[ \frac{e^{2x}}{2} + x \right] + C
\]

\[
= -e^{2x} - 2x + C
\]

where \( C \) is some constant.

2. (5 points) Find all functions \( f(x) \) with the properties \( f'(x) = x \) and \( f(0) = 3 \).

Solution: Since \( f'(x) = x \), we have

\[
f(x) = \frac{x^2}{2} + C
\]

where \( C \) is some constant. Since we’re also told that \( f(0) = 3 \), we can determine \( C \):

\[
3 = f(0) = \frac{0^2}{2} + C = C
\]

So

\[
f(x) = \frac{x^2}{2} + 3
\]