Math 142: Worksheet 2

Work in groups of 2 to 4 people on this worksheet. At the end of class, turn in your answers. (You can either turn in one worksheet for the group, or each person in the group can turn in their own worksheet.)

1. Use \( u \)-substitution with \( u = \ln x \) to evaluate the following definite integral:

\[
\int_{e}^{e^t} \frac{dx}{x\sqrt{\ln x}}
\]

2. Use \( u \)-substitution with \( u = \sqrt{x} \) to evaluate the following integral:

\[
\int \frac{\cos (\sqrt{x})}{\sqrt{x}} \, dx
\]

3. Apply the substitution \( u = \sqrt{x} \) to the following integral. **Do not evaluate the integral.**

\[
\int \cos (\sqrt{x}) \, dx
\]
4. Evaluate the following integrals.

(a) \[ \int \cos(5x) \, dx \]

(b) \[ \int x \sqrt{x^2 + 3} \, dx \]

(c) \[ \int e^x \sqrt{1 + e^x} \, dx \]

(d) \[ \int \sin^3 \theta \cos \theta \, dx \]

(e) \[ \int \tan^2 \theta \sec^2 \theta \, d\theta \]
5. The following integrals are more challenging. Try to evaluate them.

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

(b) \[ \int \frac{x}{1 + x^4} \, dx \]

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