Midterm 1

Name ____________________________________________

No calculators, notes, or cheating. Each problem is worth 5 points.

1. §5.2 #32: The graph of $g$ consists of two straight lines and a semicircle. Use it to evaluate each integral.

(a) $\int_{0}^{2} g(x) \, dx$

(b) $\int_{2}^{6} g(x) \, dx$

(c) $\int_{0}^{7} g(x) \, dx$
2. §5.3 #7: Evaluate

\[ \int_{-1}^{0} (2x - e^x) \, dx. \]
3. §5.5 #44: Evaluate

\[ \int_{0}^{\sqrt{\pi}} x \cos(x^2) \, dx. \]
4. §5.5 #55: Evaluate
\[ \int_{e^4}^{e} \frac{dx}{x \sqrt{\ln x}}. \]
Hint: Substitute \( u = \ln x \).
5. §5.6 #18: Evaluate
\[ \int_{4}^{9} \frac{\ln y}{\sqrt{y}} \, dy. \]

Hint: Integrate by parts, letting \( u = \ln y \) and \( dv = y^{-1/2} \, dy \).
6. §5.7 #3: Evaluate
\[ \int_{\pi/2}^{3\pi/4} \sin^5 x \cos^3 x \, dx. \]

Hint: Use the identity \( \cos^2 x = 1 - \sin^2 x \) and substitute \( u = \sin x \). Alternatively you could use \( \sin^2 x = 1 - \cos^2 x \) and substitute \( u = \cos x \), but it will be messier.

Don’t spend too much time simplifying your answer, but maybe notice that \( (\sqrt{2})^6 = 2^3 = 8 \) and \( (\sqrt{2})^8 = 2^4 = 16 \).
7. §5.7 #21: Use partial fractions to evaluate

\[
\int \frac{5x + 1}{(2x + 1)(x - 1)} \, dx.
\]
8. §5.8 #9: Evaluate

\[ \int_{4}^{\infty} e^{-y/2} \, dy. \]