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Complete all of the problems in class. You may work in pairs and use the textbook. One of the problems may show up on a future quiz.
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Name and section: _____

Weekly Summary:

- Improper Integrals: (§8.9)
 - 1) $\int_a^\infty f(x) dx = \lim_{t \rightarrow \infty} \int_a^t f(x) dx$ (can either converge or diverge).
 - 2) $\int_1^\infty \frac{1}{x^p} dx < \infty \Leftrightarrow p > 1$.
 - 3) Comparison Theorem: If $f(x) \geq g(x) \geq 0$ for $x \geq a$. Then:
 - i) If $\int_a^\infty f(x) dx < \infty$, then $\int_a^\infty g(x) dx < \infty$.
 - ii) If $\int_a^\infty g(x) dx$ diverges, then $\int_a^\infty f(x) dx$ diverges.
- Differential Equations: (§9.1)
$$y' = \frac{dy}{dx} = \frac{g(x)}{h(y)} \Leftrightarrow \int h(y) dy = \int g(x) dx.$$
- First Order Linear Equations: (§9.2)

Given $y' + P(x)y = Q(x)$. Let $I(x) = \exp(\int P(x) dx)$.
Then $y = \frac{1}{I(x)} [\int I(x)Q(x) dx + C]$.

Workout Problems:

- Section 8.9:
 1. Use the Comparison Theorem to determine whether the integral is convergent or divergent: $\int_1^\infty \frac{1}{\sqrt{x^3+1}} dx$. (Problem 52)
- Section 9.1:
 1. Find the equation of the curve that satisfies $dy/dx = 4x^3y$ and whose y -intercept is 7. (Problem 17)
- Section 9.1:
 1. Solve the initial-value problem: $y' - 2xy = 2xe^{x^2}$, $y(0) = 3$. (Problem 17)