**Quiz 2: Chapter 1**
**Exam 1 Review**

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Answer the following questions. *You must show your work to receive full credit.*

**Section 1.1.** Verify that $y = x\cos x$ is a solution to the differential equation

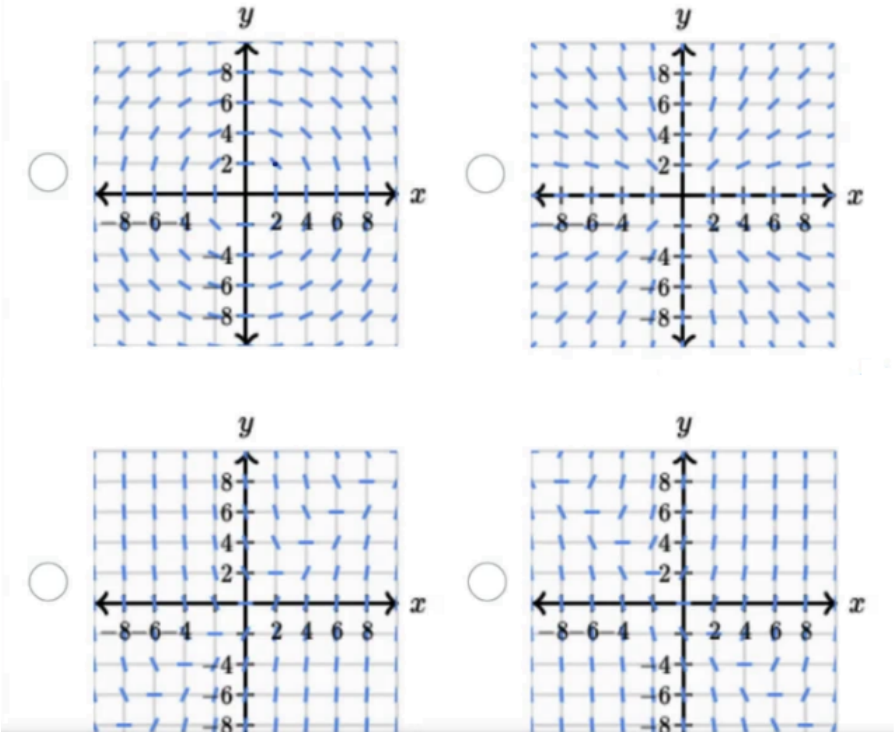
$$y' + y\tan x = \cos x.$$

**Section 1.2.** A diesel car gradually speeds up so that for the first 10s its acceleration is given by

$$\frac{dv}{dt} = (0.12)t^2 + (0.6)t \quad (\text{ft/s}^2).$$

If the car starts from rest ($x_0 = 0$, $v_0 = 0$), find the distance it has traveled at the end of the first 10 seconds and its velocity at that time.

**Section 1.3.** Which slope field is generated by the differential equation $\frac{dy}{dx} = x - y$?




**Section 1.4.** Find the general solution to the differential equation

$$2\sqrt{x}\frac{dy}{dx} = \cos^2 y.$$

**Section 1.5.** A tank initially contains 60 gallons of pure water. Brine containing 1 lb of salt per gallon enters the tank at a rate of 2 gal/min, and the (perfectly mixed) solution leaves the tank at 3 gal/min.

(a) (2 points) When is the tank empty?

(b) (6 points) Find the amount of salt in the tank after $t$ minutes.

(c) (2 points) What is the maximum amount of salt ever in the tank?

**Section 1.6.** Find the general solution to the differential equation

$$(1 + ye^{xy})dx + (2y + xe^{xy})dy = 0.$$