Name: _____ Solutions _____

- Each quiz question is labeled with its worth toward your total quiz grade for the semester.

- On multiple choice problems, you do not need to show your work. No partial credit will be given.

- On full response problems, show all of your work and give a complete solution. When in doubt, don't skip any steps. Partial credit will be given at the discretion of the professor.

- This quiz is open notes and open book.

- This quiz is due at the end of class. Quizzes submitted over one minute late will be penalized by 50%.

1. (10 points) Which of these is equal to $\int_0^1 \int_0^x \left[\int_0^y (y + xz) \, dz \right] dy \, dx$?

   ○ $-\frac{6}{11}$

   ○ $\frac{2}{25}$

   ⦿ $\frac{7}{60}$

   ○ $\frac{1}{3}$

   ○ None of these

$$= \int_0^1 \int_0^x \left[yz + \tfrac{1}{2}xz^2 \right]_0^y dy \, dx$$

$$= \int_0^1 \int_0^x y^2 + \tfrac{1}{2}xy^2 \, dy \, dx$$

$$= \int_0^1 \left[\tfrac{1}{3}y^3 + \tfrac{1}{6}xy^3 \right]_0^x dx$$

$$= \int_0^1 \tfrac{1}{3}x^3 + \tfrac{1}{6}x^4 \, dx$$

$$= \left[\tfrac{1}{12}x^4 + \tfrac{1}{30}x^5 \right]_0^1$$

$$= \tfrac{1}{12} + \tfrac{1}{30} = \frac{5+2}{60} = \frac{7}{60}$$

2. (10 points) Which of these integrals represents the volume of the solid bounded by $x = y$, $z = 0$, $y = 0$, $x = 1$, and $x + y + z = 0$?

All invalid bounds of integration

   ○ $\int_1^z \int_0^{1-x} \int_0^{1-y} 1 \, dz \, dy \, dx$ ⟶ (crossed out)

   ⦿ $\int_0^1 \int_0^x \int_{-x-y}^0 1 \, dz \, dy \, dx$

   ○ $\int_0^1 \int_0^{1-z} \int_0^{x+y+z} 1 \, dx \, dy \, dz$ (crossed out)

   ○ $\int_0^2 \int_0^z \int_0^{1-x-y} 1 \, dx \, dy \, dz$ (crossed out)