1. Find the area of the part of hyperbolic paraboloid \( z = \frac{y^2}{x^2} \) that lies between the cylinders \( x^2 + y^2 = 36 \) and \( x^2 + y^2 = 81 \).

Select the correct answer.

\[ \frac{325 \sqrt{325} - 145}{145} \]

\[ \frac{\sqrt{325} - \sqrt{145}}{3} \]

\[ \frac{\sqrt{325} - \sqrt{145}}{6} \]

\[ \frac{325 \sqrt{325} - 145}{145} \]

\[ \frac{\sqrt{325} - \sqrt{145}}{6} \]

2. Find the area of the part of paraboloid \( x = y^2 + z^2 \) that lies inside the cylinder \( z^2 + y^2 = 4 \).

Select the correct answer.

\[ \frac{6}{16} \sqrt{16} - 1 \]

\[ \frac{6}{17} \sqrt{17} - 1 \]

\[ \frac{3}{17} \sqrt{17} - 1 \]

\[ \frac{6}{16} \sqrt{16} - 1 \]

\[ \frac{6}{17} \sqrt{17} - 1 \]

3. Evaluate the triple integral.

\[ \int \int \int_E y \cos(x^2) \, dV \]

where

\[ E = \left\{ (x, y, z) \mid 0 \leq x \leq 2, 0 \leq y \leq 2, x, x \leq z \leq 5 \right\} \]

Select the correct answer. The choices are rounded to the nearest tenth.

a. 130.3
b. 260.6
c. 156.3
d. 1433.1
e. 1042.3

5. Evaluate the triple integral

\[ \int \int \int_E (4x + 2y) \, dV \]

where \( E \) is bounded by the parabolic cylinder \( y = x^2 \) and the planes \( x = z \), \( x = y \), and \( z = 0 \).

Select the correct answer. The choices are rounded to the nearest hundredth.

a. 4.3
b. 0.1
c. 2.6
d. 0.6
e. 0.3

6. Use a triple integral to find the volume of the solid bounded by the cylinder \( x = y^2 \) and the planes \( z = 0 \) and \( x + z = 1 \).

Select the correct answer. The choices are rounded to the nearest tenth.

a. 0.5
b. 0.6
c. 1.5
d. 0.2
e. 0.1

7. Express the integral as an iterated integral of the form

\[ \int \int \int_{E} f(x, y, z) \, dV \]

where

\[ E = \left\{ (x, y, z) \mid 0 \leq x \leq 2, 0 \leq y \leq 2, x, x \leq z \leq 5 \right\} \]

as an iterated integral of the form

\[ \int_{a}^{b} \int_{a(x)}^{b(x)} \int_{a(x,y)}^{b(x,y)} f(x, y) \, dz \, dy \, dx \]

where \( E \) is the solid bounded by the surfaces \( x^2 + y^2 = 25 \), \( y = 0 \), and \( y = 2 \).

Select the correct answer.
9. Set up, but do not evaluate, an integral expression for the moment of inertia about the \( z \)-axis where \( E \) is bounded by the paraboloid \( x = 6 \sqrt{y^2 + 6} \) and the plane \( x = 6 \):

\[
\rho(x, y, z) = x^2 + y^2 + z^2.
\]

Select the correct answer.

8. Express the integral

\[
\int \int f(x, y, z) \, dz \, dx \, dy
\]

in the form

\[
b \, v(x) \, d(x,y) \int \int a \, u(x) \, f(x,y) \, dx \, dy.
\]

Select the correct answer.

10. Find the average value of the function \( f(x, y, z) = xyz \) over the cube with side length 2 that lies in the first octant with one vertex at the origin and edges parallel to the coordinate axes.

Select the correct answer. The choices are rounded to the nearest thousandth.

- a. 0.25
- b. 0.5
- c. 8
- d. 1
- e. 4
- f. none of those

11. Find the area of the part of the surface \( y = 4x + z^2 \) that lies between the planes \( x = 0, x = 7, z = 0, \) and \( z = 1 \).

Select the correct answer. The choices are rounded to the nearest thousandth.

- a. 28.952
- b. 31.987
- c. 29.957
- d. 26.477
- e. 40.057

12. Express the volume of the wedge in the first octant that is cut from the cylinder \( y^2 + z^2 = 1 \) by the planes \( y = x \) and \( x = 5 \) as an iterated integral with respect to \( z \), then to \( y \), then to \( x \).

Select the correct answer.
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