**Math 3C Homework #8**

Due at 3:30PM on Thursday, April 27th 2017

Good luck!

**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

**Find the volume of the indicated region.**

1) the tetrahedron cut off from the first octant by the plane $\frac{x}{8} + \frac{y}{7} + \frac{z}{4} = 1$ 1) _____

A) 112 B) $\frac{112}{3}$ C) 56 D) $\frac{224}{3}$

2) the region bounded by the paraboloid $z = 100 - x^2 - y^2$ and the xy-plane 2) _____

A) $\frac{10,000}{3}\pi$ B) $5000\pi$ C) $500\pi$ D) $\frac{1000}{3}\pi$

3) the region bounded by the paraboloid $z = 1 - \frac{x^2}{100} - \frac{y^2}{36}$ and the xy-plane 3) _____

A) $180\pi$ B) $20\pi$ C) $30\pi$ D) $300\pi$

4) the region bounded by the cylinder $x^2 + y^2 = 9$ and the planes $z = 0$ and $x + z = 9$ 4) _____

A) $27\pi$ B) $81\pi$ C) $729\pi$ D) $243\pi$

5) the region in the first octant bounded by the coordinate planes and the surface $z = 64 - x^2 - y$ 5) _____

A) 8192 B) $\frac{32,768}{3}$ C) $\frac{65,536}{9}$ D) $\frac{131,072}{15}$

6) the region in the first octant bounded by the coordinate planes and the planes $x + z = 5$, $y + 6z = 30$ 6) _____

A) 125 B) $\frac{125}{6}$ C) 625 D) 25

7) the region common to the interiors of the cylinders $x^2 + y^2 = 36$ and $x^2 + z^2 = 36$ 7) _____

A) 144 B) 864 C) 1152 D) 288

8) the region bounded by the coordinate planes and the planes $z = x + y$, $z = 6$ 8) _____

A) 72 B) 108 C) 36 D) 54

9) the region bounded by the coordinate planes, the parabolic cylinder $z = 9 - x^2$, and the plane $y = 4$ 9) _____

A) 162 B) 81 C) 216 D) 72

10) the region bounded by the paraboloid $z = x^2 + y^2$ and the cylinder $x^2 + y^2 = 100$ 10) _____

A) $\frac{40000}{3}\pi$ B) $\frac{10000}{3}\pi$ C) $5000\pi$ D) $15000\pi$

**Use the given transformation to evaluate the integral.**

11) $u = 2x + y - z$, $v = -x + y + z$, $w = -x + y + 2z$; 11) _____

$$\iiint_R dx\,dy\,dz,$$

where R is the parallelepiped bounded by the planes $2x + y - z = 2$, $2x + y - z = 10$, $-x + y + z = 2$, $-x + y + z = 6$, $-x + y + 2z = 5$, $-x + y + 2z = 6$

A) 96 B) $\frac{32}{3}$ C) $\frac{64}{3}$ D) 48

12) $u = 2x + y - z$, $v = -x + y + z$, $w = -x + y + 2z$; 12) _____

$$\iiint_R (2x + y - z)(z - x + y)(2z - x + y)\,dx\,dy\,dz,$$

where R is the parallelepiped bounded by the planes $2x + y - z = 2$, $2x + y - z = 3$, $-x + y + z = 7$, $-x + y + z = 9$, $-x + y + 2z = 2$, $-x + y + 2z = 9$

A) 2310 B) 4620 C) $\frac{6160}{3}$ D) $\frac{1540}{3}$

**Solve the problem.**

13) Find the center of mass of the region of density $\varrho(x, y, z) = \frac{1}{4 - x^2 - y^2}$ bounded by the paraboloid $z = 4 - x^2 - y^2$ and the xy-plane. 13) _____

A) $\bar{x} = 0, \bar{y} = 0, \bar{z} = \frac{1}{2}$ B) $\bar{x} = 0, \bar{y} = 0, \bar{z} = 1$

C) $\bar{x} = 0, \bar{y} = 0, \bar{z} = \frac{2}{3}$ D) $\bar{x} = 0, \bar{y} = 0, \bar{z} = 2$

**Use cylindrical coordinates to find the volume of the indicated region.**

14) the region enclosed by the paraboloids $z = x^2 + y^2 - 7$ and $z = 43 - x^2 - y^2$ 14) _____

A) $625\pi$ B) $1875\pi$ C) $1250\pi$ D) $2500\pi$

15) the region enclosed by the cylinder $x^2 + y^2 = 36$ and the planes $z = 0$ and $x + y + z = 12$ 15) _____

A) $864\pi$ B) $648\pi$ C) $432\pi$ D) $216\pi$

16) the region enclosed by the paraboloids $z = x^2 + y^2 - 2$ and $z = 30 - x^2 - y^2$ 16) _____

A) $1024\pi$ B) $256\pi$ C) $768\pi$ D) $512\pi$

**Use spherical coordinates to find the volume of the indicated region.**

17) the region bounded above by the sphere $x^2 + y^2 + z^2 = 64$ and below by the cone $z = \sqrt{x^2 + y^2}$ 17) _____

A) $128\pi(2 - \sqrt{3})$

B) $\frac{512}{3}\pi(2 - \sqrt{2})$

C) $128\pi(2 - \sqrt{2})$

D) $\frac{512}{3}\pi(2 - \sqrt{3})$

18) the region enclosed by the cone $z^2 = x^2 + y^2$ between the planes $z = 4$ and $z = 9$ 18) _____

A) $\frac{665}{4}$

B) $\frac{665}{3}$

C) $\frac{665}{4}\pi$

D) $\frac{665}{3}\pi$

19) the region that lies inside the sphere $x^2 + y^2 + z^2 = 49$ and outside the cylinder $x^2 + y^2 = 36$ 19) _____

A) $\frac{5(343 - 13^{3/2})\pi}{2}$

B) $\frac{4(343 - 13^{3/2})\pi}{3}$

C) $\frac{2(343 - 13^{3/2})\pi}{3}$

D) $\frac{3(343 - 13^{3/2})\pi}{2}$