Math 2013 Practice Quiz 3 Part 2 New Fall 2012

Name: Last ______________, First ______________

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. You must show your work to get credit.

Solve the problem.

1) Write an iterated triple integral in the order dx dy dz for the volume of the tetrahedron cut from the first octant by the plane $\frac{x}{9} + \frac{y}{4} + \frac{z}{6} = 1$. 1) ________

A) $\int_0^6 \int_0^{9(1-y/4)} \int_0^{9(1-y/4-z/6)} dx\,dy\,dz$

B) $\int_0^6 \int_0^{4(1-z/6)} \int_0^{9(1-y/4-z/6)} dx\,dy\,dz$

C) $\int_0^6 \int_0^{1-z/6} \int_0^{1-y/4-z/6} dx\,dy\,dz$

D) $\int_0^6 \int_0^{1-y/4} \int_0^{1-y/4-z/6} dx\,dy\,dz$

2) Write an iterated triple integral in the order dz dy dx for the volume of the region in the first octant enclosed by the cylinder $x^2 + y^2 = 100$ and the plane $z = 4$. 2) ________

A) $\int_0^{10} \int_0^{\sqrt{100-x^2}} \int_0^{y} dz\,dy\,dx$

B) $\int_0^{10} \int_0^{\sqrt{100-x^2}} \int_0^{4} dz\,dy\,dx$

C) $\int_0^{10} \int_0^{\sqrt{100-y^2}} \int_0^{4-y} dz\,dy\,dx$

D) $\int_0^{10} \int_0^{\sqrt{100-y^2}} \int_0^{4} dz\,dy\,dx$

3) Rewrite the integral 3) ________

$$\int_0^{1/2} \int_0^{(1-2z)/9} \int_0^{(1-9y-2z)/6} dx\,dy\,dz$$

in the order dz dy dx.

A) $\int_0^{1/2} \int_0^{(1-2z)/9} \int_0^{(1-9y-2z)/6} dz\,dy\,dx$

B) $\int_0^{1/6} \int_0^{(1-6x)/9} \int_0^{(1-6x-9y)/2} dz\,dy\,dx$

C) $\int_0^{1/2} \int_0^{(1-6x)/9} \int_0^{(1-2x-9y)/6} dz\,dy\,dx$

D) $\int_0^{1/6} \int_0^{(1-6x)/9} \int_0^{(1-9x-6y)/2} dz\,dy\,dx$

Evaluate the integral.

4) $\displaystyle\int_0^3 \int_0^{\sqrt{9 - y^2}} \int_0^{3x + 6y} dz\, dx\, dy$ 4) ________

A) 9 B) 27 C) 243 D) 81

5) $\displaystyle\int_{-1}^1 \int_0^5 \int_0^1 (x^2 + y^2 + z^2)\, dx\, dy\, dz$ 5) ________

A) 124 B) 23.2 C) 126 D) 90

Find the volume of the indicated region.

6) the tetrahedron cut off from the first octant by the plane $\frac{x}{9} + \frac{y}{4} + \frac{z}{7} = 1$ 6) ________

A) 84 B) 63 C) 42 D) 126

7) the region bounded by the paraboloid $z = 49 - x^2 - y^2$ and the xy-plane 7) ________

A) $\frac{343}{3}\pi$ B) $\frac{343}{2}\pi$ C) $\frac{2401}{2}\pi$ D) $\frac{2401}{3}\pi$

8) the region bounded by the coordinate planes, the parabolic cylinder $z = 4 - x^2$, and the plane $y = 5$ 8) ________

A) $\frac{80}{3}$ B) 80 C) 30 D) 60

9) the region bounded by the paraboloid $z = x^2 + y^2$ and the cylinder $x^2 + y^2 = 16$ 9) ________

A) $\frac{1024}{3}\pi$ B) 128π C) 384π D) $\frac{256}{3}\pi$

Find the average value of F(x, y, z) over the given region.

10) $F(x, y, z) = xyz$ over the rectangular solid in the first octant bounded by the coordinate planes and the planes $x = 5$, $y = 10$, $z = 7$ 10) ________

A) $\frac{175}{8}$ B) $\frac{175}{4}$ C) $\frac{175}{9}$ D) $\frac{175}{6}$

11) $F(x, y, z) = x^4 y^3 z^6$ over the cube in the first octant bounded by the coordinate planes and the planes $x = 1$, $y = 1$, $z = 1$ 11) ________

A) $\frac{1}{72}$ B) $\frac{1}{126}$ C) $\frac{1}{54}$ D) $\frac{1}{140}$

Evaluate the integral by changing the order of integration in an appropriate way.

12) $\displaystyle\int_0^1 \int_0^4 \int_y^4 \frac{x \sin z}{z}\, dz\, dy\, dx$ 12) ________

A) $\frac{1 - \cos 4}{2}$ B) $1 + \cos 4$ C) $\frac{1 + \sin 4}{2}$ D) $1 - \sin 4$

13) $\displaystyle\int_0^{512}\int_0^{10}\int_{\sqrt[3]{x}}^{8} \frac{z}{y^4+1}\,dy\,dz\,dx$ 13) _______

A) 25 ln 4097 B) 25 ln 513 C) $\frac{25}{2}$ ln 4097 D) $\frac{25}{2}$ ln 513

Evaluate the line integral along the curve C.

14) $\displaystyle\int_C (y+z)\,ds$, C is the straight–line segment $x = 0$, $y = 5 - t$, $z = t$ from (0, 5, 0) to (0, 0, 5) 14) _______

A) $25\sqrt{2}$ B) $\frac{25}{2}$ C) 0 D) 25

15) $\displaystyle\int_C \frac{x+y+z}{5}\,ds$, C is the curve $\mathbf{r}(t) = 4t\mathbf{i} + (8\cos\frac{3}{8}t)\mathbf{j} + (8\sin\frac{3}{8}t)\mathbf{k}$, $0 \le t \le \frac{8}{3}\pi$ 15) _______

A) $\frac{128}{9}\pi^2 + \frac{128}{3}$ B) $\frac{128}{9}\pi^2 + \frac{256}{3}$ C) $\frac{128}{9}\pi$ D) $\frac{128}{9} + \frac{128}{3}$

16) $\displaystyle\int_C (y+z)\,ds$, C is the path from (0, 0, 0) to (–3, 3, 1) given by: 16) _______

C_1: $\mathbf{r}(t) = -3t^2\mathbf{i} + 3t\mathbf{j}$, $0 \le t \le 1$

C_2: $\mathbf{r}(t) = -3\mathbf{i} + 3\mathbf{j} + (t-1)\mathbf{k}$, $1 \le t \le 2$

A) $\frac{25}{2}$ B) $\frac{15}{4}\sqrt{5} + \frac{11}{4}$ C) $\frac{15}{4}\sqrt{5} - \frac{11}{4}$ D) $\frac{13}{12}$

17) $\displaystyle\int_C \frac{1}{x^2+y^2+z^2}\,ds$, C is the path given by: 17) _______

C_1: $\mathbf{r}(t) = (5\cos t)\mathbf{i} + (5\sin t)\mathbf{j}$ from (5, 0, 0) to (0, 5, 0)

C_2: $\mathbf{r}(t) = (5\sin t)\mathbf{j} + (5\cos t)\mathbf{k}$ from (0, 5, 0) to (0, 0, 5)

C_3: $\mathbf{r}(t) = (5\sin t)\mathbf{i} + (5\cos t)\mathbf{k}$ from (0, 0, 5) to (5, 0, 0)

A) $\frac{3}{10}\pi$ B) $\frac{\pi}{10}$ C) 0 D) $-\frac{3}{10}\pi$

Evaluate the line integral of f(x,y) along the curve C.

18) $f(x, y) = \dfrac{x^4}{\sqrt{1+4y}}$, C: $y = x^2$, $0 \le x \le 1$ 18) _______

A) $\frac{1}{4}$ B) 1 C) 0 D) $\frac{1}{5}$

19) $f(x, y) = \cos x + \sin y$, C: $y = x$, $0 \le x \le \frac{\pi}{2}$ 19) _______

A) 0 B) $\sqrt{2}$ C) $2\sqrt{2}$ D) 2

Find the center of mass of the wire that lies along the curve r and has density δ.

20) $\mathbf{r}(t) = (4 + 2t)\mathbf{i} + \mathbf{j} + 3t\mathbf{k},\ 0 \le t \le 1;\ \ \delta(x, y, z) = x + z^2$ 20) ________

A) $\left(\frac{251}{48}, 0, \frac{59}{32}\right)$ B) $\left(\frac{251}{48}, 1, \frac{59}{32}\right)$ C) $\left(\frac{251}{6}, 8, 177\right)$ D) $\left(502, 0, 177\right)$

Find the mass of the wire that lies along the curve r and has density δ.

21) $\mathbf{r}(t) = (8 \cos t)\mathbf{i} + (8 \sin t)\mathbf{j} + 8t\mathbf{k},\ 0 \le t \le 2\pi;\ \ \delta = 2$ 21) ________

A) 4π units B) $16\pi\sqrt{2}$ units C) $256\pi\sqrt{2}$ units D) $32\pi\sqrt{2}$ units

Find the work done by F over the curve in the direction of increasing t.

22) $\mathbf{F} = -6y\mathbf{i} + 6x\mathbf{j} + 9z^3\mathbf{k}$; C: $\mathbf{r}(t) = \cos t\mathbf{i} + \sin t\mathbf{j},\ 0 \le t \le 7$ 22) ________

A) $W = 0$ B) $W = 84$ C) $W = 147$ D) $W = 42$

Calculate the circulation of the field F around the closed curve C.

23) $\mathbf{F} = xy\mathbf{i} + 3\mathbf{j}$, curve C is $\mathbf{r}(t) = 2 \cos t\mathbf{i} + 2 \sin t\mathbf{j},\ 0 \le t \le 2\pi$ 23) ________

A) 0 B) 6 C) $\frac{26}{3}$ D) $\frac{10}{3}$

Calculate the flux of the field F across the closed plane curve C.

24) $\mathbf{F} = y^3\mathbf{i} + x^2\mathbf{j}$; the curve C is the closed counterclockwise path formed from the semicircle $\mathbf{r}(t) = 5 \cos t\mathbf{i} + 5 \sin t\mathbf{j},\ 0 \le t \le \pi$, and the straight line segment from $(-5, 0)$ to $(5, 0)$ 24) ________

A) $-\frac{50}{3}$ B) $\frac{50}{3}$ C) $\frac{100}{3}$ D) 0

Calculate the flow in the field F along the path C.

25) $\mathbf{F} = y^2\mathbf{i} + z\mathbf{j} + x\mathbf{k}$; C is the curve $\mathbf{r}(t) = (2 + 2t)\mathbf{i} + 3t\mathbf{j} - 3t\mathbf{k},\ 0 \le t \le 1$ 25) ________

A) $\frac{9}{2}$ B) $-\frac{15}{2}$ C) 39 D) -3

Find the gradient field of the function.

26) $f(x, y, z) = x^7y^8 + \frac{x^3}{z^4}$ 26) ________

A) $\nabla f = (7x^6 + 3x^2)\mathbf{i} + 8y^7\mathbf{j} - \frac{4}{z^5}\mathbf{k}$

B) $\nabla f = \left(7x^6y^8 + \frac{3x^2}{z^4}\right)\mathbf{i} + 8x^7y^7\mathbf{j} - \frac{4x^3}{z^5}\mathbf{k}$

C) $\nabla f = 7x^6y^8\mathbf{i} + 8x^7y^7\mathbf{j} - \frac{4x^7}{z^5}\mathbf{k}$

D) $\nabla f = (7x^6 + 3x^2)\mathbf{i} + 8y^7\mathbf{j} + \frac{4}{z^5}\mathbf{k}$

27) $f(x, y, z) = e^{x^6 + y^5 + z^3}$ 27) ________

A) $\nabla f = 6x^5e^{x^6}\mathbf{i} + 5y^4e^{y^5}\mathbf{j} + 3z^2e^{z^3}\mathbf{k}$

B) $\nabla f = x^5e^{x^6 + y^5 + z^3}\mathbf{i} + y^4e^{x^6 + y^5 + z^3}\mathbf{j} + z^2e^{x^6 + y^5 + z^3}\mathbf{k}$

C) $\nabla f = 6x^5e^{x^6 + y^5 + z^3}\mathbf{i} + 5y^4e^{x^6 + y^5 + z^3}\mathbf{j} + 3z^2e^{x^6 + y^5 + z^3}\mathbf{k}$

D) $\nabla f = x^6e^{x^6 + y^5 + z^3}\mathbf{i} + y^5e^{x^6 + y^5 + z^3}\mathbf{j} + z^3e^{x^6 + y^5 + z^3}\mathbf{k}$

Calculate the circulation of the field F around the closed curve C.

28) $\mathbf{F} = x^2y^3\mathbf{i} + x^2y^3\mathbf{j}$; curve C is the counterclockwise path around the rectangle with vertices at (0, 0), (4, 0), (4, 2), and (0, 2) 28) _______

A) $-\frac{320}{3}$ B) $\frac{704}{3}$ C) -256 D) 0

29) $\mathbf{F} = (-x - y)\mathbf{i} + (x + y)\mathbf{j}$, curve C is the counterclockwise path around the circle with radius 4 centered at (10, 3) 29) _______

A) 64π B) $32(1 + \pi) + 208$ C) $32(1 + \pi)$ D) 32π

Find the potential function f for the field F.

30) $\mathbf{F} = \frac{1}{z}\mathbf{i} - 6\mathbf{j} - \frac{x}{z^2}\mathbf{k}$ 30) _______

A) $f(x, y, z) = \frac{x}{z} + C$ B) $f(x, y, z) = \frac{x}{z} - 6 + C$

C) $f(x, y, z) = \frac{x}{z} - 6y + C$ D) $f(x, y, z) = \frac{2x}{z} - 6y + C$

31) $\mathbf{F} = (y - z)\mathbf{i} + (x + 2y - z)\mathbf{j} - (x + y)\mathbf{k}$ 31) _______

A) $f(x, y, z) = x(y + y^2) - xz - yz + C$ B) $f(x, y, z) = xy + y^2 - x - y + C$

C) $f(x, y, z) = x + y^2 - xz - yz + C$ D) $f(x, y, z) = xy + y^2 - xz - yz + C$

Evaluate the work done between point 1 and point 2 for the conservative field F.

32) $\mathbf{F} = 6 \sin 6x \cos 4y \cos 6z\mathbf{i} + 4 \cos 6x \sin 4y \cos 6z\mathbf{j} + 6 \cos 6x \cos 4y \sin 6z\mathbf{k}$; $P_1(0, 0, 0)$, $P_2\left(\frac{1}{3}\pi, \frac{1}{2}\pi, \frac{\pi}{6}\right)$ 32) _______

A) W = –2 B) W = 2 C) W = 0 D) W = 1

Using Green's Theorem, compute the counterclockwise circulation of F around the closed curve C.

33) $\mathbf{F} = xy\mathbf{i} + x\mathbf{j}$; C is the triangle with vertices at (0, 0), (6, 0), and (0, 8) 33) _______

A) 0 B) – 24 C) 88 D) 64

Using Green's Theorem, find the outward flux of F across the closed curve C.

34) $\mathbf{F} = \sin 10y\mathbf{i} + \cos 4x\mathbf{j}$; C is the rectangle with vertices at (0, 0), $\left(\frac{\pi}{10}, 0\right)$, $\left(\frac{\pi}{10}, \frac{\pi}{4}\right)$, and $\left(0, \frac{\pi}{4}\right)$ 34) _______

A) $\frac{1}{5}\pi$ B) $-\frac{2}{5}\pi$ C) $-\frac{1}{5}\pi$ D) 0

Calculate the area of the surface S.

35) S is the portion of the cylinder $x^2 + y^2 = 36$ that lies between z = 1 and z = 2. 35) _______

A) 18π B) 12π C) 36π D) 6π

1) B
2) B
3) B
4) D
5) D
6) C
7) C
8) A
9) B
10) B
11) D
12) A
13) C
14) A
15) A
16) B
17) B
18) D
19) C
20) B
21) D
22) D
23) A
24) D
25) B
26) B
27) C
28) A
29) D
30) C
31) D
32) B
33) B
34) D
35) B