King Fahd University of Petroleum and Minerals

Department of Mathematics and Statistics — Spring Semester (Term 162)

Quiz 4 — Calculus III — Dr. Taleb Alkurdi

Name_____ ID_____ Serial Number _____

Important Note: Please show your work in order to get the full grade. There is only one point for the final answer and the rest will be for the details of the work.

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

Evaluate the integral.

1) $\int_1^{e^2}\int_1^{e^9}\int_1^{e^{10}} \frac{1}{xyz}\,dx\,dy\,dz$ 1) _____

A) 360 B) 60 C) 180 D) 540

Find the volume of the indicated region.

2) the region bounded above by the sphere $x^2 + y^2 + z^2 = 100$ and below by the cone $z = \sqrt{x^2 + y^2}$ 2) _____

A) $\frac{1000}{3}\pi(2 - \sqrt{3})$ B) $\frac{1000}{3}\pi(2 - \sqrt{2})$ C) $250\pi(2 - \sqrt{2})$ D) $250\pi(2 - \sqrt{3})$

Solve the problem.

3) Write an iterated triple integral in the order dz dy dx for the volume of the region enclosed by the paraboloids $z = 32 - x^2 - y^2$ and $z = x^2 + y^2$. 3) _____

A) $\int_{-4}^{4}\int_{-\sqrt{32 - x^2}}^{\sqrt{32 - x^2}}\int_{x^2 + y^2}^{32 - x^2 - y^2} dz\,dy\,dx$

B) $\int_{-4}^{4}\int_{-\sqrt{32 - x^2}}^{\sqrt{32 - x^2}}\int_{x^2 + y^2}^{16 - x^2 - y^2} dz\,dy\,dx$

C) $\int_{-4}^{4}\int_{-\sqrt{16 - x^2}}^{\sqrt{16 - x^2}}\int_{x^2 + y^2}^{16 - x^2 - y^2} dz\,dy\,dx$

D) $\int_{-4}^{4}\int_{-\sqrt{16 - x^2}}^{\sqrt{16 - x^2}}\int_{x^2 + y^2}^{32 - x^2 - y^2} dz\,dy\,dx$

Change the Cartesian integral to an equivalent polar integral, and then evaluate.

4) $\int_{-3}^{3} \int_{-\sqrt{9 - x^2}}^{\sqrt{9 - x^2}} \frac{1}{(1 + x^2 + y^2)^2} \, dy \, dx$ 4) _____

A) $\frac{18}{5}\pi$ B) $\frac{9}{10}\pi$ C) $\frac{9}{5}\pi$ D) $\frac{9}{19}\pi$

Solve the problem.

5) Let D be the region bounded below by the xy-plane, above by the sphere $x^2 + y^2 + z^2 = 100$, and on the sides by the cylinder $x^2 + y^2 = 64$. Set up the triple integral in cylindrical coordinates that gives the volume of D using the order of integration $d\theta \, dz \, dr$. 5) _____

A) $\int_0^{2\pi} \int_0^{\sqrt{100 - r^2}} \int_0^{8} r \, d\theta \, dz \, dr$

B) $\int_0^{10} \int_0^{\sqrt{64 - r^2}} \int_0^{2\pi} r \, d\theta \, dz \, dr$

C) $\int_0^{2\pi} \int_0^{\sqrt{100 - r^2}} \int_0^{10} r \, d\theta \, dz \, dr$

D) $\int_0^{8} \int_0^{\sqrt{100 - r^2}} \int_0^{2\pi} r \, d\theta \, dz \, dr$