Math 20550 Calculus III Tutorial
April 16, 2015

Name: _____

Tutorial Worksheet

1. Write the integral that corresponds to the surface area of the surface $x^2 + y^2 + z = 4$ above xy-plane.

(a) $\int_0^{2\pi} \int_0^2 \sqrt{1 + 4r^2}\ r\, dr\, d\theta$

(b) $\int_0^{2\pi} \int_0^2 \sqrt{1 + 4r^2}\ dr\ d\theta$

(c) $\int_0^{2\pi} \int_0^4 \sqrt{1 + 4r^2}\ r\, dr\, d\theta$

(d) $\int_0^{2\pi} \int_0^2 \sqrt{1 + r^2}\ r\, dr\, d\theta$

(e) $\int_0^{\pi} \int_0^2 \sqrt{1 + 4r^2}\ r\, dr\, d\theta$

2. Evaluate $\int_C \mathbf{F} \cdot d\mathbf{r}$ where $\mathbf{F} = \langle y - \cos y, x \sin y \rangle$ and C is the circle $(x-3)^2 + (y+4)^2 = 4$ oriented clockwise.

3. Evaluate $\int_C \mathbf{F} \cdot d\mathbf{r}$ where $\mathbf{F} = \langle x^2 + y, 3x - y^2 \rangle$ and C is the positively oriented boundary curve of a region D that has area 6.

4. Find an equation for the tangent plane of the surface $z = x^2 + y^3 - 8$ at the point $(1, 2, 1)$.

(a) $x + 6y = 13$ (b) $-2x - 12y + z = -25$ (c) $x + 2y + z = 6$
(d) $2x + 8y + z = 19$ (e) $2x + 12y + z = 27$

5. Determine two vectors that are tangent to the surface $\mathbf{r}(u, v) = \langle uv^2 - 2v, vu^2 - u, uv \rangle$ at the point $(0, 1, 2)$.

(a) $\langle 2, 4, 2 \rangle$, $\langle 1, 3, 1 \rangle$ (b) $\langle 2, 1, 1 \rangle$, $\langle 4, 3, 2 \rangle$ (c) $\langle 0, 1, 1 \rangle$, $\langle 4, 1, 1 \rangle$
(d) $\langle 1, 2, -1 \rangle$, $\langle 1, -2, 1 \rangle$ (e) $\langle 0, 2, -1 \rangle$, $\langle 1, -6, 3 \rangle$