Test-3-version A

No work = No credit!

1. Find the volume of solid bounded by cylinder $x^2 + y^2 = r^2$ and $y^2 + z^2 = r^2$.
   (15 pt. Hint: this question is from WebAssign 4.1, no need to change coordinates)

2. Find the center of mass of the solid E, which is the cube given by $0 \le x \le a$, $0 \le y \le a$, and $0 \le z \le a$, density $\sigma(x, y, z) = x^2 + y^2 + z^2$. (15 pt)

3. Find the area of the region inside $r = 2\cos(2\theta)$ and outside $r = \cos(2\theta)$, $\theta \in [-\pi/4, \pi/4]$.

4. Find the volume of the solid that lies between $z = x^2 + y^2$ and $x^2 + y^2 + z^2 = 2$.

5. Evaluate $\iiint_E \sqrt{x^2 + y^2 + z^2}dV$, where E lies above $z = \sqrt{x^2 + y^2}$ and between $x^2 + y^2 + z^2 = 1$ and $x^2 + y^2 + z^2 = 4$. (15 pt)

6. Evaluate the $\int_C x^2 y \; ds$, $C: \; x = \cos(t), \; y = \sin(t), \; z = t, \; 0 \le t \le \pi/2$. (15 pt)

7. Evaluate the following integrals (20 pt)
   a) $\int_C \overrightarrow{F} \cdot d\overrightarrow{r}$, where $\overrightarrow{F} = \langle x^2y^3, \; x^3y^2 \rangle$ and $C: \; \overrightarrow{r}(t) = \langle t^3 - 2t, t^3 + 2t \rangle, \; 0 \le t \le 1$
   b) $\oint_C \overrightarrow{F} \cdot d\overrightarrow{r}$, where $\overrightarrow{F} = \langle x^2+y^2, x^2-y^2 \rangle$, C is the positively oriented triangle with vertices $(0, 0)$, $(2, 1)$, and $(0, 1)$

Test-2-version B

No work = No credit!

1. Find the volume of solid bounded by cylinder $x^2 + y^2 = r^2$ and $y^2 + z^2 = r^2$.
   (15 pt. Hint: this question is from WebAssign 4.1, no need to change coordinates)

2. Find the center of mass of the solid E, which is the cube given by $0 \le x \le a$, $0 \le y \le a$, and $0 \le z \le a$, density $\sigma(x, y, z) = x^2 + y^2 + z^2$. (15 pt)

3. Find the area of the region inside $r = 2\cos(2\theta)$ and outside $r = \cos(2\theta)$, $\theta \in [-\pi/4, \pi/4]$.

4. Find the volume of the solid that lies between $z = x^2 + y^2$ and $x^2 + y^2 + z^2 = 2$.

5. Evaluate $\iiint_E \sqrt{x^2 + y^2 + z^2}dV$, where E lies above $z = \sqrt{x^2 + y^2}$ and between $x^2 + y^2 + z^2 = 1$ and $x^2 + y^2 + z^2 = 4$. (15 pt)

6. Evaluate the $\int_C x^2 y \; ds$, $C: \; x = \sin(t), \; y = \cos(t), \; z = t, \; 0 \le t \le \pi/2$. (15 pt)

7. Evaluate the following integrals (20 pt)
   a) $\int_C \overrightarrow{F} \cdot d\overrightarrow{r}$, where $\overrightarrow{F} = \langle x^2y^3, \; x^3y^2 \rangle$ and $C: \; \overrightarrow{r}(t) = \langle t^3 - 2t, t^3 + 2t \rangle, \; 0 \le t \le 1$
   b) $\oint_C \overrightarrow{F} \cdot d\overrightarrow{r}$, where $\overrightarrow{F} = \langle x^2+y^2, x^2-y^2 \rangle$, C is the positively oriented triangle with vertices $(0, 0)$, $(2, 1)$, and $(0, 1)$