Additional exercises for Math201 and Math206

17.7: 25,26,27,28, 29,30,

17.8: 37(volume only)

Also, the following problems:

Q1. If $w = f(x, y) = \ln\sqrt{x^2 + y^2}$, find $\frac{\partial w}{\partial x}$ and $\frac{\partial w}{\partial y}$

Q2. Show that the function $w = f(x^2 - y^2, y^2 - x^2)$ satisfies the relation

$$y\frac{\partial w}{\partial x} + x\frac{\partial w}{\partial y} = 0$$

Q3. Evaluate the following integrals:

a. $\int_{-3}^{3} \int_{-\sqrt{9-x^2}}^{\sqrt{9-x^2}} \int_{0}^{9-x^2-y^2} x^2 dz dy dx$

b. $\int_{-2}^{2} \int_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}} \int_{0}^{\sqrt{9-x^2-y^2}} z^2\sqrt{x^2 + y^2 + z^2} dz dy dx$

Q4. Find the volume of the solid bounded above by the hemisphere $z = \sqrt{25 - x^2 - y^2}$, inside the cylinder $x^2 + y^2 = 9$, and above the xy −plane.

Q5. Find the volume of the solid bounded above by hemisphere $z = \sqrt{16 - x^2 - y^2}$, inside the cylinder $r = 4\cos\theta$ and above xy −plane.

Q6. Find the volume of the solid bounded above by the sphere $x^2 + y^2 + z^2 = 16$ and below by the cone $z = \sqrt{x^2 + y^2}$.