(1) Section 17.5: 8, 11 (give a brief explanation using the physical interpretation of curl and divergence), 16, 21, 30, 31
(2) Section 17.6: 4, 6, 20, 34
(3) Let $S$ be the part of the hemisphere $x^2 + y^2 + z^2 = 4$, $z \geq 0$ that lies inside the cylinder $x^2 + y^2 = 2y$.
   (a) Describe the projection $D$ of $S$ onto the $xy$-plane.
   (b) Show that $S$ is the graph of a function on $D$.
   (c) Find the area of this surface.
(4) Let $S$ be the surface (a torus):
   \[(\sqrt{x^2 + y^2} - 2)^2 + z^2 = 1\]
   (a) Show that the following is a parametrization of $S$:
   \[
   \mathbf{r}(u, v) = ((2 + \cos(v))\cos(u), \ (2 + \cos(v))\sin(u), \ \sin(v))
   \]
   (b) Describe the grid curves (i.e., the $u$-curves (constant $v$) and $v$-curves (constant $u$) for this parametrization.
   (c) Find all points on $S$ for which the tangent plane is horizontal (i.e., parallel to the $xy$-plane).
   (d) Find the area of this surface.