Supplemental Exercises for Section15.6

Find spherical coordinated for each of the points below given in rectangular coordinates.

1. $(0, 0, 0)$

2. $(0, 0, 1)$

3. $(0, -1, 0)$

4. $(1, 0, 0)$

5. $(1, 1, 0)$

6. $(1, 0, 1)$

7. $(0, 1, 1)$

8. $(-1, 1, 0)$

9. $(0, -1, -1)$

10. $(\sqrt{3}, 1, 2\sqrt{3})$

11. $(-1, 1, -1)$

12. $(1, 1, -1)$

Find rectangular coordinated for each of the points below given in spherical coordinates.

13. $(\sqrt{3}, \frac{\pi}{3}, \frac{-\pi}{2})$

14. $(2\sqrt{2}, \frac{\pi}{2}, \frac{3\pi}{2})$

15. $(\sqrt{2}, \pi, \pi)$

16. $(2\sqrt{2}, \frac{\pi}{6}, \frac{3\pi}{4})$

In the following translate the given equation and inequalities from the given coordinate system (rectangular or spherical) into the other.

17. $z = \sqrt{x^2 + y^2}, \ z \leq 1$

18. $x^2 + y^2 + (z - \frac{1}{2})^2 = \frac{1}{4}$

19. $\rho = 5 \cos \phi$

20. $\rho = \sqrt{2} \csc \phi$

21. $x^2 + y^2 + (z - 1)^2 = 1, \ z \leq 1$

22. $\rho = 3, \ \frac{\pi}{3} \leq \phi \leq \frac{2\pi}{3}$

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23. $\phi = \frac{3\pi}{4}$, $0 \le \rho \le 2$

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3. $(1, 0, \frac{3\pi}{2})$
5. $(\sqrt{2}, \frac{\pi}{2}, \frac{\pi}{4})$
11. $(\sqrt{3}, \arccos -\frac{1}{\sqrt{3}}, \frac{3\pi}{4})$
13. $(\frac{3\sqrt{2}}{4}, -\frac{3\sqrt{2}}{4}, \frac{\sqrt{3}}{2})$
14. $(0, -2\sqrt{2}, 0)$
17. $\phi - \frac{\pi}{4}$, $0 \le \rho \le \sqrt{2}$
19. $x^2 + y^2 + (z - \frac{5}{2})^2 = \frac{25}{4}$
23. $z = -\sqrt{x^2 + y^2}$, $-1 \le z \le 0$