Homework #89 **Answers**

**From Houghton-Mifflin Precalculus** 3rd Edition

p775:

18) (4, 1, 9), (2, 1, 6)

$d = \sqrt{(4 - 2)^2 + (1 - 1)^2 + (9 - 6)^2} = \sqrt{4 + 0 + 9} = \sqrt{13}$

19) (-1, 4, -2), (5, -6, 2)

$d = \sqrt{(-1 - 5)^2 + (4 - -6)^2 + (-2 - 2)^2} = \sqrt{36 + 100 + 16} = \sqrt{152} = 2\sqrt{38}$

25) A(1, -3, -2), B(5, -1, 2), C(-1, 1, 2)

$AB = \sqrt{(1 - 5)^2 + (-3 - -1)^2 + (-2 - 2)^2} = \sqrt{16 + 4 + 16} = \sqrt{36} = 6$

$BC = \sqrt{(5 - -1)^2 + (-1 - 1)^2 + (2 - 2)^2} = \sqrt{36 + 4 + 0} = \sqrt{40} = 2\sqrt{10}$

$CA = \sqrt{(-1 - 1)^2 + (1 - -3)^2 + (2 - -2)^2} = \sqrt{4 + 16 + 16} = \sqrt{36} = 6$

28) (2, -2, -8), (4, 4, 16)

$M = [\frac{1}{2}(2 + 4), \frac{1}{2}(-2 + 4), \frac{1}{2}(-8 + 16)] = (3, 1, 4)$

29) (6, -2, 5), (-4, 2, 6)

$M = [\frac{1}{2}(6 + -4), \frac{1}{2}(-2 + 2), \frac{1}{2}(5 + 6)] = (1, 0, 5.5)$

33) center: (3, 2, 4), r = 4

$(x - 3)^2 + (y - 2)^2 + (z - 4)^2 = 16$

37) center: (-3, 7, 5), d = 10

$(x + 3)^2 + (y - 7)^2 + (z - 5)^2 = 25$

43) $x^2 + y^2 + z^2 + 4x - 8z + 19 = 0$

$(x^2 + 4x) + (y^2) + (z^2 - 8z) = -19$

$(x^2 + 4x + 4) + y^2 + (z^2 - 8z + 16) = -19 + 4 + 16$

$(x + 2)^2 + y^2 + (z - 4)^2 = 1$

center: (-2, 0, 4), r = 1

45) $9x^2 + 9y^2 + 9z^2 - 18x - 6y - 72z + 73 = 0$

$9x^2 - 18x + 9y^2 - 6y + 9z^2 - 72z = -73$

$9(x^2 - 2x) + 9(y^2 - 2/3y) + 9(z^2 - 8z) = -73$

$9(x^2 - 2x + 1) + 9(y^2 - 2/3y + 1/9) + 9(z^2 - 8z + 16) = -73 + 9 + 1 + 144$

$9(x - 1)^2 + 9(y - 1/3)^2 + 9(z - 4)^2 = 81$

$(x - 1)^2 + (y - 1/3)^2 + (z - 4)^2 = 9$

center: (1, 1/3, 4), r = 3