Honors Calculus, Math 1451- HW 2 (due Thursday 30th January)

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(1) Find the angle between the vectors $\overrightarrow{a} = 2i + 3j - k$ and $\overrightarrow{b} = -i + 4j + k$.

(2) Find the equation of a plane passing through $(1, -4, 3)$ and with normal vector $(2, -1, 4)$.

(3) Where does the plane $2x + 4y - z = 5$ intersect the line $x = 4 + 3t$, $y = 3$, $z = -2t$?

(4) Find a unit vector orthogonal to the points $(1, -2, 0)$ and $(1, 0, 3)$.

(5) Find the point where the line through $(1, 0, 1)$ and $(4, -2, 1)$ intersects the plane $x + y + z = 4$.

(6) Verify that the formula $a \times (b \times c) = (a \times b) \times c$ holds for the vectors $a = (1, 0, 1)$, $b = (0, 1, 0)$ and $c = (1, 1, 1)$. In fact this formula holds for all vectors $a$, $b$ and $c$ in $\mathbb{R}^3$. Similar verify $a \times (b \times c) = (a \cdot c)b - (a \cdot b)c$ for the vectors $a = (1, 0, 1)$, $b = (0, 1, 0)$ and $c = (1, 1, 1)$. This formula also holds for all vectors $a$, $b$ and $c$ in $\mathbb{R}^3$.

(7) Questions in 12.5: 4, 6, 12, 16, 20, 36, 48.

(8) Also in 12.5: 68, 70.