MAC 2313 Sept 15, 2020
Quiz II Key Prof. S. Hudson

1) (25pts) Find parametric equations for the line that passes through the point $P(-3, 4, 1)$ and is parallel to the vector $\mathbf{v} = \langle 1, 1, 2\rangle$. For a little extra credit, decide whether the line passes through the point $Q(4, 2, 7)$ and justify.

2a) (20pts) Find the area of the triangle $T = \Delta PQR$ given the 3 points $P(2, -2, 1)$, $Q(3, -1, 2)$ and $R(3, -1, 1)$

2b) (15pts) Find a unit vector orthogonal to the plane PQR that contains these three points.

3) (40pts) Answer each with True or False. You do not have to explain.

It is possible for two vectors in R^3 that $\mathbf{u} \cdot \mathbf{v} = \mathbf{u} \times \mathbf{v}$.

The quadratic surface $x^2 + y^2 + 17z^2 = 17$ has a saddle point.

One trace of $z = x^2 - y^2 + 17$ is the hyperbola where $x^2 - y^2 = 1$ and $z = 18$.

For all angles $x > 0$, $\cos^2 x = \frac{1+\cos 2x}{2}$.

In R^3, if $\mathbf{v} \perp \mathbf{j}$ then $\text{proj}_{\mathbf{j}}\mathbf{v} = \mathbf{0}$.

Remarks, Answers: The average grade was approx 78 out of 100 (or 105 with extra credit) among the top 18 scores, which is a big improvement. The high scores were 101 and 96. Probably C's would start around 67 if there were a scale.

1) $x = -3 + t$, $y = 4 + t$ and $z = 1 + 2t$. Show some work, such as the $\mathbf{r}(t)$ formula.

2a) Compute any two sides, as vectors, such as $\overrightarrow{PQ} = \langle 1, 1, 1\rangle$ and $\overrightarrow{PR} = \langle 1, 1, 0\rangle$. Then the cross product is $\mathbf{n} = \langle -1, 1, 0\rangle$. The area is $||\mathbf{n}||/2 = \sqrt{2}/2$.

2b) Normalize $\mathbf{n}$ and get $\frac{1}{\sqrt{2}}\langle -1, 1, 0\rangle$. I guess you might get the negative of this vector if you started out differently, but I didn't see that happen while grading.

3) FFTTT.