

Exam I Hints and Answers
Math 126 E Spring 2014

1. (a) (3 points) $(x - 4)^2 + (y - 7)^2 + (z - 6)^2 = 6^2$
(b) (3 points) $(-\sqrt{12}, -\frac{\pi}{6})$
(c) (5 points) $\cos^{-1}\left(\frac{15}{\sqrt{11}\sqrt{21}}\right)$ OR $\pi - \cos^{-1}\left(\frac{-15}{\sqrt{11}\sqrt{21}}\right)$
2. (a) (4 points) Standard form: $\frac{(x - 2)^2}{8} + \frac{(y - 1)^2}{4} - \frac{z}{2} = 1$; elliptic paraboloid
(b) (5 points) $\mathbf{v} = \left\langle \frac{26}{\sqrt{185 + 49\pi^2}}, \frac{14\pi}{\sqrt{185 + 49\pi^2}}, \frac{8}{\sqrt{185 + 49\pi^2}} \right\rangle$
3. (a) (4 points) $\overrightarrow{PQ} = \langle -4, 1, 1 \rangle$ and $\overrightarrow{PR} = \langle 1, -1, 4 \rangle$. $\overrightarrow{PQ} \times \overrightarrow{PR} = \langle 5, 17, 3 \rangle \neq 0$. So, \overrightarrow{PQ} is not parallel to \overrightarrow{PR} and the three points do not lie on a single line.
(b) (4 points) area of triangle = $\frac{\sqrt{323}}{2}$
(c) (6 points) $\left(\frac{13}{3}, \frac{2}{3}, \frac{2}{3}\right)$
4. (a) (4 points) $\mathbf{r}(t) = \left\langle \frac{t^3}{20}, t, \frac{t^2}{4} \right\rangle$
(b) (4 points) $\kappa(20) = \frac{\sqrt{3745}}{2(3701)^{3/2}}$
5. (a) (5 points) slope of tangent line = $-\frac{3}{3 + \sqrt{2}}$
(b) (3 points) ii is the correct graph.