Exam I Answers
Math 126 E & F Spring 2017

Version 1: In #1, A is the point $(3,0,4)$.

1. (a) area of the parallelogram is $\sqrt{137}$.
   (b) One possible set of parametric equations for the line through A and C:

$$x=3, y=3t, z=4-5t.$$

2. $a=2, b=-\frac{6}{\sqrt{5}}$ and $a=-2, b=\frac{6}{\sqrt{5}}$

3. (a) A direction vector for $\mathbf{r}_1$ is $\mathbf{v}_1=\langle -2,1,-6\rangle$.
   A direction vector for $\mathbf{r}_2$ is $\mathbf{v}_2=\langle 1,-\frac{1}{2},3\rangle$.
   Since $\mathbf{v}_2=-\frac{1}{2}\mathbf{v}_1$, the lines are parallel.
   (b) $11x+10y-2z=31$

4. (a) $\left(-10,\dfrac{\pi}{6}\right)$
   (b) slope of the tangent line is $\frac{1}{2}$

5. The curve intersects the elliptic paraboloid at $t=5$.
   $\kappa(5)=\frac{8\sqrt{2}}{(1602)^{3/2}}$

Version 2: In #1, A is the point $(2,0,3)$.

1. (a) area of the parallelogram is $4\sqrt{3}$.
   (b) One possible set of parametric equations for the line through A and C:

$$x=2, y=4t, z=3-4t.$$

2. $a=2, b=-2\sqrt{\frac{6}{5}}$ and $a=-2, b=2\sqrt{\frac{6}{5}}$

3. (a) A direction vector for $\mathbf{r}_1$ is $\mathbf{v}_1=\langle -3,2,-6\rangle$.
   A direction vector for $\mathbf{r}_2$ is $\mathbf{v}_2=\langle 1,-\frac{2}{3},2\rangle$.
   Since $\mathbf{v}_2=-\frac{1}{3}\mathbf{v}_1$, the lines are parallel.
   (b) $4x+9y+z=17$

4. (a) $\left(-10,\dfrac{\pi}{6}\right)$
   (b) slope of the tangent line is $\frac{1}{2}$

5. The curve intersects the elliptic paraboloid at $t=3$.
   $\kappa(3)=\frac{12\sqrt{2}}{(1298)^{3/2}}$