Multiple Choice Questions - Exercise 6.9

1. What is the rotation angle θ for the equation $5x^2 - 6xy + 5y^2 - 8 = 0$ to eliminate the xy-term?
   a) $30°$
   b) $45°$
   c) $60°$
   d) $90°$

2. For the transformation $x = X\cos\theta - Y\sin\theta$, if $\theta = 45°$, what is the expression for x?
   a) $\frac{X-Y}{\sqrt{2}}$
   b) $\frac{X+Y}{\sqrt{2}}$
   c) $X - Y$
   d) $X + Y$

3. After rotating the axes for $4x^2 - 4xy + y^2 - 6 = 0$ with $\tan\theta = 2$, the transformed equation is $Y^2 = \frac{6}{5}$. What type of conic is this?
   a) Ellipse
   b) Parabola
   c) Hyperbola
   d) Circle

4. For the equation $x^2 - 2xy + y^2 - 8x - 8y = 0$, the rotation angle θ is $45°$. What is the vertex of the resulting parabola?
   a) $(0,0)$
   b) $(1,1)$
   c) $(\sqrt{2},0)$
   d) $(-\sqrt{2},0)$

5. What is the slope of the tangent to $3x^2 - 7y^2 + 2x - y - 48 = 0$ at the point $(4,1)$?
   a) $\frac{26}{15}$
   b) $\frac{15}{26}$
   c) $-\frac{1}{3}$
   d) $\frac{5}{8}$

6. For the equation $10xy + 8x - 15y - 12 = 0$, what does the determinant condition indicate?
   a) Represents a circle
   b) Represents a pair of straight lines
   c) Represents an ellipse
   d) Represents a hyperbola

7. The transformed equation of $x^2 + xy + y^2 - 4 = 0$ after rotation with $\theta = 45°$ is $\frac{X^2}{8} + \frac{Y^2}{8} = 3$. What is the center of this conic?
   a) $(0,0)$

b) $(1,1)$
c) $(2,2)$
d) $(-\sqrt{2},\sqrt{2})$

8. For $x^2+5xy-4y^2+4=0$ at the point $(0,-1)$, what is the equation of the tangent?
   a) $5x-8y-8=0$
   b) $5x+8y+8=0$
   c) $8x-5y-8=0$
   d) $8x+5y-8=0$
9. In the equation $6x^2+xy-y^2-21x-8y+9=0$, if the determinant is zero, what does it represent?
   a) Single line
   b) Pair of straight lines
   c) Parabola
   d) Ellipse
10. What is the focus of the parabola $Y^2-4\sqrt{2}X=0$ derived from $x^2-2xy+y^2-8x-8y=0$?
   a) $(\sqrt{2},0)$
   b) $(0,\sqrt{2})$
   c) $(-\sqrt{2},0)$
   d) $(0,-\sqrt{2})$