

Quiz 4
Math 31–6429

You should fully justify your answers. Do all your work on separate paper, and make sure to *print* your name in the first sheet and staple all the sheets together. **Unstapled, loose pieces of paper will not be graded.** This quiz is due on Thursday, October 11, at 6:00 pm.

1. Calculate the following limits:

(a) $\lim_{\theta \rightarrow 0} \frac{\cos \theta - 1}{\sin \theta}$

(b) $\lim_{x \rightarrow 2} \frac{\sin(x - 2)}{x^2 + x - 6}$

2. Find all points on the graph of

$$y = \cos 3x + \sin 3x$$

at which the tangent line is horizontal.

3. Find an equation for the line tangent to the graph of

$$f(x) = \cos(\sin x)$$

at the point with $x = \pi$.

4. Find an equation for the line tangent to the graph of

$$yx^2 + xy^2 + 4x = 0$$

at the point $(4, -2)$.

5. Show that the following curves are orthogonal:

$$x^2 - y^2 = 5, \quad 4x^2 + 9y^2 = 72.$$

6. **Extra Credit:** Let f be a differentiable function with domain \mathbb{R} . Prove that

- (a) If f is an even function then f' is odd.
(b) If f is an odd function then f' is even.