

# Calculus Quiz 4

1. (5 pts)

a. Suppose  $f\left(\frac{\pi}{3}\right) = 4$  and  $f'\left(\frac{\pi}{3}\right) = -2$  and let

$$g(x) = f(x) \sin x, \quad h(x) = \frac{\cos x}{f(x)}$$

Find  $g'\left(\frac{\pi}{3}\right)$  and  $h'\left(\frac{\pi}{3}\right)$ .

b. Let  $p(x) = ax^2 + bx$ ,  $q(x) = cx^2 + dx$  and let

$$f(x) = p(x) \cos x + q(x) \sin x$$

Determine  $a, b, c, d$  such that  $f(x)$  satisfies the equation

$$f''(x) + f(x) = x \sin x$$

2. (5 pts)

- a. For what values of  $x$  does the graph of  $f(x) = x + 2 \sin x$  have a horizontal tangent?
- b. Find equation of the lines both tangent to parabolas  $y = x^2$  and  $y = -x^2 + 4x - 10$ .