# HOMEWORK 6

**Due on:** October 28 at 2:00pm (submit via Crowdmark).

**Question 1.** Use logarithmic differentiation to find the derivative of

$$y = \frac{\sqrt[3]{x+3}\sqrt[5]{x+5}}{\sqrt[7]{x+7}\sqrt[9]{x+9}}$$

(no marks will be given for any other method).

**Question 2.** Find the line tangent to $y = (x^2+1)^x$ at the point $(1, 2)$.

**Question 3.** Find the normal line to the curve $y = \arctan\sqrt{x}$ at $x = 1$. (There is a short note about normal lines on the section website.)

**Question 4.** Two boats are sailing toward a lighthouse. Boat A is sailing south at $20_{km/h}$ while boat B is sailing west at $30_{km/h}$. What is the rate of change of the distance between the boats when boat A is 30km north of the lighthouse and boat B is 40km east of the lighthouse?

**Question 5.** Peter Pan sells flying powder. The the price of the powder $p$ (in dollars per gram) is related to the daily demand $q$ (measured in kilograms per day) via the equation

$$10p + 100q^2 + p^2q = 1300 \ .$$

(a) Find the daily demand if the price is 10 dollars per gram.
(b) Peter Pan raises the price (continuously) at a rate of 2 dollars per day. At what rate will the daily demand change when the price is 10 dollars per gram? When giving your answer, make sure to specify the unit of measurement as well.