

MATH 141: HOUR QUIZ 2

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Answer the questions in the spaces provided on the question sheets and turn them in at the end of the lab. You may use all prior lab work (homework, lab activities, etc.). However, you may not work with any other student. Unless otherwise stated, no supporting work is required.

Name and section: _____

1 (3 Points). *Compute the derivative of $f(\theta) = \cot^2(\sin(\theta))$.*

2 (4 Points). *Find an equation of the tangent line to the curve $y^2(y^2 - 4) = x^2(x^2 - 5)$ at $(0, -2)$.*

3 (1 Point). *A cylindrical can is to be made to hold 1000 milliliters of liquid. Find the dimensions that will minimize the cost of the material used to manufacture the can.*

[If r is the radius of the base of the cylinder, and h the height of the cylinder, then surface area and volume of a cylinder are given by $A(r, h) = 2\pi r^2 + 2\pi rh$ and $V(r, h) = \pi r^2 h$.]

4 (3 Points). *Let $f(x) = x^3 - 4x + 1$.*

(a) Find an equation of the tangent line at the point $x = a$.

(b) Find an equation of the tangent line at the point $(1, -2)$.

(c) Find an equation of the tangent line at the point $(2, 1)$.

5 (4 Points). *Find a point on the curve $2(x^2 + y^2)^2 = 25(x^2 - y^2)$ in the first quadrant where the tangent line is horizontal.*

6 (Bonus - 5 Points). *Find the point on the parabola $y^2 = 2x$ that is closest to the point $(1, 4)$.*