For full credit show all of your work (legibly!), unless otherwise specified. Answers may include all arithmetic operations, trigonometric functions, inverse trigonometric functions, and natural logarithms. Algebraic simplification of answers is unnecessary.

1. **(14 points)** The *conchoid of de Sluze* is a curve satisfying the equation $(x-1)(x^2+y^2) = 4x^2$.

   (a) **(10 points)** Find a formula for $\frac{dy}{dx}$ on this curve.

   (b) **(4 points)** Find the equation of the tangent line to the curve at $(3, -3)$.

2. **(12 points)** Find $\frac{d}{dx}\frac{\arcsin x}{(\sin e^x)-7}$.

1	/ 14
2	/ 12
3	/ 21
4	/ 10
5	/ 8
6	/ 8
7	/ 10
8	/ 15
Σ	/100

3. **(21 points)** Answer the following derivative-related questions.

   (a) **(7 points)** If $y = e^{\sqrt{\tan\theta}}$, find $\frac{dy}{d\theta}$.

   (b) **(7 points)** Compute $\frac{d}{dt}\frac{t^3-\csc t}{\arctan t}$.

   (c) **(7 points)** If $f(x) = e^{4x}\ln x$, find $f'(x)$.

4. **(10 points)** Find an equation of the tangent line to the curve $y = \frac{x^2-3\ln x}{x-2}$ at $(1,-1)$.

5. **(8 points)** Find the absolute maximum and minumum values of the function $f(x) = 5 + 54x - 2x^3$ on the interval $[0, 4]$.

6. **(8 points)** Estimate the following values using appropriate linear approximations.

   (a) **(4 points)** $\sqrt[3]{1000.3}$

   (b) **(4 points)** $(-2.994)^4$

7. **(12 points)** Calculate $\frac{d}{dt}\left[(t^3 + 5t^4)\tan(\ln t)\right]$.

8. **(15 points)** A parachuter, currently at a height of 0.4 miles above the ground, is falling straight downwards at a speed of 10 miles per hour. You are 0.3 miles away from the landing site, standing still and recording the descent with a camera.

   (a) **(9 points)** How quickly are you and the parachuter approaching each other?

   (b) **(6 points)** How quickly should you be tilting the camera in order to keep the parachuter in the frame?