Circle one: Rhodes (F01) ∣ Bueler (F02)

25 points possible. No aids (book, calculator, etc.) are permitted. You need not simplify, but show all work and use proper notation for full credit.

1. **[15 points]** Differentiate the following. Use proper notation to indicate your answer.

   a. $f(t) = \sqrt{2 + \sin x}$

   b. $g(x) = \sec^2(5x)$

   c. $f(x) = e^{x \tan x}$

   d. $f(\theta) = \theta \sin\theta \cos\theta$

   e. $y = x10^x$

2. **[4 points]** An object is at position $s(t) = \sqrt{t^2 - 4t + 7}$ meters at time $t \geq 0$ seconds. When, if ever, is its instantaneous velocity 0?

3. **[6 points]** Find an equation of the tangent line to the curve $y = \dfrac{2}{(\sin x + 1)^2}$ at the point where $x = \pi$.