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/m170.sp08/handouts170/LogJam303/LogJam303/

Pencils and Erasers Only – No Calculators Needed – No Decimal Points in Answers!.**1** Substitute and simplify in each case:

- (a) If $y = x^2$, compute and simplify $x^2y'' + 6xy' + 6y$.
- (b) If $y = x^{-2}$, compute and simplify $x^2y'' + 6xy' + 6y$.
- (c) If $y = e^{4x}$, compute and simplify $y'' - 6y' + 9y$.
- (d) If $y = e^{3x}$, compute and simplify $y'' - 6y' + 9y$.
- (e) If $y = xe^{3x}$, compute and simplify $y'' - 6y' + 9y$.
- (f) If $y = x \ln(x)$, compute and simplify $x^2y'' - xy' + y$.

2 Compute the derivatives. Simplify.

- (a) $g(t) = \ln(t^3 + 5)$
- (b) $f(\theta) = \ln(\csc(\theta))$
- (c) $H(\theta) = \ln(\sec(\theta) + \tan(\theta))$

3 Find an equation for the line tangent to the given function at the point of tangency with the given x -coordinate.

- (a) $f(x) = \frac{e^x + e^{-x}}{2}$ at $x = \ln(3)$
- (b) $f(x) = \sqrt{x} \ln(x)$ at $x = e^4$
- (c) $f(x) = \cos(\ln(x))$ at $x = e^{\pi/3}$