Math 30b Orrison
Logarithms, Exponentials, and Approximations
Friday, October 2, 2015

18.{1.ii, 1.iv, 1.vi, 1.x, 5.ii, 5.iv, 5.vi, 8.b, 8.d, 8.f}, 20.{1.ii, 1.iv, 1.vi, 2.ii, 2.iv}

18.1.ii
Differentiate

$$f(x) = \log\left(1 + \log\left(1 + \log\left(1 + e^{1+e^{1+x}}\right)\right)\right).$$

■

18.1.iv
Differentiate

$$f(x) = e^{\left(\int_0^x e^{-t^2} dt\right)}.$$

■

18.1.vi
Differentiate

$$f(x) = \log_{e^x} \sin x.$$

■

18.1.x
Differentiate

$$f(x) = x^x.$$

■

18.5.ii
Find the following limit by l'Hopital's Rule.

$$\lim_{x \to 0} \frac{e^x - 1 - x - x^2/2 - x^3/6}{x^3}.$$

■

18.5.iv
Find the following limit by l'Hopital's Rule.

$$\lim_{x\to 0} \frac{\log(1+x) - x + x^2/2}{x^2}.$$

■

18.5.vi
Find the following limit by l'Hopital's Rule.

$$\lim_{x\to 0} \frac{\log(1+x) - x + x^2/2 - x^3/3}{x^3}.$$

■

18.8.b
Prove that

$$\tanh^2 + \frac{1}{\cosh^2} = 1.$$

■

18.8.d
Prove that

$$\cosh(x+y) = \cosh x \cosh y + \sinh x \sinh y.$$

■

18.8.f
Prove that

$$\cosh' = \sinh.$$

■

20.1.ii
Find the Taylor polynomials (of the indicated degree, at the indicated point) for

$$f(x) = e^{\sin x}; \text{ degree } 3, \text{ at } 0.$$

■

20.1.iv
Find the Taylor polynomials (of the indicated degree, at the indicated point) for

$$\cos\,;\ \text{degree } 2n,\ \text{at } \pi.$$

■

20.1.vi
Find the Taylor polynomials (of the indicated degree, at the indicated point) for

$$\log\,;\ \text{degree } n,\ \text{at } 2.$$

■

20.2.ii
Write the following polynomial in x as a polynomial in $(x-3)$:

$$x^4 - 12x^3 + 44x^2 + 2x + 1.$$

■

20.2.iv
Write the following polynomial in x as a polynomial in $(x-3)$:

$$ax^2 + bx + c.$$

■