Name: ———————————————————————   ————— / 24

30 minutes maximum. 24 points possible; each part is worth 2 points. No aids (book, notes, calculator, phone, etc.) are permitted. Show all work and use proper notation for full credit. Answers should be in reasonably-simplified form.

1. [12 points] Compute the derivatives of the following functions.

a. $f(x) = e^2 x^{1/2} + 2e^x + \sqrt{9}$

b. $f(x) = \ln\left(\cos(x^3) - 4x^7\right)$

c. $h(x) = \sin(kx^2 - 5)$ where k is a constant

d. $f(x) = \sec(xe^x)$

e. $y = \dfrac{\cos(2x)}{x^5 + \pi}$

f. Find $\dfrac{dy}{dx}$ if $e^y \cos(x) = xy + 1$. You must solve for $\dfrac{dy}{dx}$.

2. **[12 points]** Compute the following antiderivatives (indefinite integrals) and definite integrals. Remember that antiderivatives need a "$+C$".

a. $\displaystyle \int \frac{(1+x)^2}{2x}\, dx$

b. $\displaystyle \int (x-1)\, e^{\left((x-1)^2\right)}\, dx$

c. $\displaystyle \int_0^\pi 5e^x + 3\sin(x)\, dx$

d. $\displaystyle \int x\sqrt{x+5}\,dx$

e. $\displaystyle \int \frac{\cos(\ln x)}{x}\,dx$

f. $\displaystyle \int \frac{\sec^2(x)}{\tan^2(x)}\,dx$