Math 151 **Name (Print):** _____
Spring 2021 TA: _____
Week 4 Section # _____

(P459 Ex16) 1. A chain lying on the ground is 10 m long and its total mass is 80 Kg. How much work is required to raise one end of the chain to a height of 6 m?

(P463 Ex20) 2. A cup of coffee has temperature 95°C and takes 30 minutes to cool to 61°C in a room with temperature 20°C. According to Newton's Law of Cooling, the temperature of the coffee after t minutes is $T(t) = 20 + 75e^{-kt}$ where $k \approx 0.02$. What is the average temperature of the coffee during the first half hour?

3. Using a similar technique to the one introduced in Sec. 7.2 for $\int \cos^n(x) \sin^m(x)\, dx$, integrate:

   (a) $\displaystyle\int \sinh^3(x) \cosh^5(x)\, dx$

(b) $\int \sec^2(x)\tan^4(x)\,dx$

4. Use integration by parts to evaluate the integrals.

(P476 Ex6) (a) $\int (x-1)\,\sin(\pi x)dx$

(b) $\int \cos(ax)\,f'(x)\,dx$

5. Use integration by parts to prove the reduction formula:

$$\int (\ln x)^n dx = x(\ln x)^n - n\int (\ln x)^{n-1} dx$$