Math 151 **Name (Print):** ____________________
Spring 2021 redID: ____________________
Week#01 Section # ____________

1. Find the derivatives of the functions in the parenthesis with respect to x.

(a) $[c]'$

(h) $[f(g(x))]'$

(b) $[x]'$

(i) $[\cos(x)]'$

(c) $[x^n]'$

(j) $[\sin(x)]'$

(d) $[cf(x)]'$

(k) $[\exp(a\,x)]' = [e^{ax}]'$

(e) $[f(x) + g(x)]'$

(l) $[\ln(x)]'$

(f) $[f(x) \cdot g(x)]'$

(m) $[a^x]'$

(g) $\left[\dfrac{f(x)}{g(x)}\right]'$

(n) $\left[\dfrac{1}{x}\right]'$

2. Find the derivatives of more interesting functions.

   (a) $[\sqrt{x}]'$

   (b) $[\tan^{-1}(x)]'$

   (c) $\left[\dfrac{x^2+1}{\ln x}\right]'$

   (d) $[e^x\sqrt{x}]'$

   (e) $[\cos\big(\ln(x^3+2)\big)]'$

   (f) $[(x^2+2x)^4]'$

3. Basic facts you HAVE TO KNOW!

(a) $\ln e^x =$

(b) $e^{\ln x} =$

(c) $e^a e^b =$

(d) $\dfrac{e^a}{e^b} =$

(e) $e^0 =$

(f) $\lim_{x\to-\infty} e^x =$

(g) $\lim_{x\to+\infty} e^x =$

(h) Graph $\exp(x) = e^x$

(i) $\ln(xy) =$

(j) $\ln(x/y) =$

(k) $\ln x^n =$

(l) $\lim_{x\to 0^+} \ln x =$

(m) $\lim_{x\to+\infty} \ln x =$

(n) $\ln(1) =$

(o) $\ln(e) =$

(p) Graph $\ln(x)$

4. Evaluate the integrals with respect to x.

(a) $\int a\ dx$

(f) $\int e^x\ dx$

(b) $\int x^n\ dx$

(g) $\int a^x\ dx$

(c) $\int \sin(x)\ dx$

(h) $\int \frac{1}{\sqrt{1-x^2}}\ dx$

(d) $\int \cos(x)\ dx$

(i) $\int \frac{1}{1+x^2}\ dx$

(e) $\int \frac{1}{x}\ dx$

(j) $\int \frac{1}{a^2+x^2}\ dx$

5. Evaluate the integrals using u-substitution.

(a) $\int 2x\sqrt{x^2+1}\ dx$

(b) $\int \frac{x}{x^2+2}\ dx$

(c) $\int_0^{1/6} \frac{1}{\sqrt{1-9x^2}}\ dx$

(d) $\int_0^2 \frac{1}{4+x^2}\ dx$

(e) $\frac{d}{dx}\int_3^{\sqrt{x}} \ln t\ dt$

(f) $\int x^2 \cos(x^3+1)dx$

1: Definite Integrals

- if $F = \int f(x)\ dx$, then $\int_a^b f(x)\ dx = [F(x)]_a^b = F(b) - F(a)$
- $\frac{d}{dx}\int_a^b f(x)\ dx = 0$
- $\frac{d}{dx}\int_a^x f(t)\ dt = f(x)$
- $\frac{d}{dx}\int_a^{g(x)} f(t)\ dt = g'(x)f(g(x))$
- $\int_a^b \frac{d}{dx}f(x)\ dx = f(b) - f(a)$
- $\int_a^a f(x)\ dx = 0$
- $\int_a^b f(x)\ dx = -\int_b^a f(x)\ dx$