Math 1431

Section 16679

Bekki George: rageorge@central.uh.edu

University of Houston

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Office Hours: Tuesdays & Thursdays 11:45-12:45
(also available by appointment)
Office: 218C PGH

Course webpage: www.casa.uh.edu

Questions?

Derivatives Review

Rules:

(1) $f'(x) = \lim_{h \to 0} \dfrac{f(x+h) - f(x)}{h}$

(2) $\dfrac{d}{dx}(c) = 0,\ c$ any constant

(3) $\dfrac{d}{dx}(x) = 1$

(4) $\dfrac{d}{dx}\left(x^p\right) = p\, x^{p-1}$

(5) $\dfrac{d}{dx}[f(x) \pm g(x)] = f'(x) \pm g'(x)$

(6) $\dfrac{d}{dx}(c \cdot f(x)) = c \cdot f'(x)$

Derivatives Review

(7) $$\frac{d}{dx}[f(x)\cdot g(x)] = f'(x)\cdot g(x) + f(x)\cdot g'(x)$$

(8) $$\frac{d}{dx}\left(\frac{f(x)}{g(x)}\right) = \frac{f'(x)\cdot g(x) - f(x)\cdot g'(x)}{(g(x))^2}$$

(9) $$\frac{d}{dx}\left(\frac{1}{g(x)}\right) = \frac{-g'(x)}{(g(x))^2}$$

(10) $$\frac{d}{dx}[f(g(x))] = f'(g(x))\cdot g'(x)$$

(11) $$\frac{d}{dx}\left(f^{-1}(x)\right) = \left(f^{-1}\right)'(x) = \frac{1}{f'\left(f^{-1}(x)\right)}$$

Derivatives Review

Formulas: (note: u is a function of x)

(1) $\dfrac{d}{dx}(\sin(x)) = \cos(x)$

(2) $\dfrac{d}{dx}(\cos(x)) = -\sin(x)$

(3) $\dfrac{d}{dx}(\tan(x)) = \sec^2(x)$

(4) $\dfrac{d}{dx}(\sec(x)) = \sec(x)\ \tan(x)$

(5) $\dfrac{d}{dx}(\cot(x)) = -\csc^2(x)$

(6) $\dfrac{d}{dx}(\csc(x)) = -\csc(x)\ \cot(x)$

Derivatives Review

(7) $\dfrac{d}{dx}(\sinh(x)) = \cosh(x)$

(8) $\dfrac{d}{dx}(\cosh(x)) = \sinh(x)$

(9) $\dfrac{d}{dx}(e^x) = e^x$

(10a) $\dfrac{d}{dx}(a^x) = a^x \ln(a)$

(10b) $\dfrac{d}{dx}(a^u) = a^u \ln(a)\, u'$

(11a) $\dfrac{d}{dx}(\ln(x)) = \dfrac{1}{x}$

(11b) $\dfrac{d}{dx}(\ln(u)) = \dfrac{u'}{u}$

Derivatives Review

(12) $$\frac{d}{dx}(\log_a(x)) = \frac{1}{x\ \ln(a)}$$

(13a) $$\frac{d}{dx}(\arctan(x)) = \frac{1}{1+x^2}$$

(13b) $$\frac{d}{dx}(\arctan(u)) = \frac{u'}{1+u^2}$$

(14a) $$\frac{d}{dx}(\arcsin(x)) = \frac{1}{\sqrt{1-x^2}}$$

(14b) $$\frac{d}{dx}(\arcsin(u)) = \frac{u'}{\sqrt{1-u^2}}$$

Integration Review

Properties of the Integral:

(1) $\displaystyle\int_a^b f(x)\,dx = -\int_b^a f(x)\,dx$

(2) $\displaystyle\int_a^a f(x)\,dx = 0$

(3) $\displaystyle\int_a^b kf(x)\,dx = k\int_a^b f(x)\,dx$

(4) $\displaystyle\int_a^b [f(x)+g(x)]\,dx = \int_a^b f(x)\,dx + \int_a^b g(x)\,dx$

(5) $\displaystyle\int_a^b f(x)\,dx = \int_a^c f(x)\,dx + \int_c^b f(x)\,dx \quad (a<c<b)$

Integration Review

(6) $$\int_a^b F'(x)\,dx = F(b) - F(a)$$

(7) $$\frac{d}{dx}\int_a^x f(t)\,dt = f(x)$$

(8) $$\frac{d}{dx}\int_a^{g(x)} f(t)\,dt = f(g(x)) \cdot g'(x)$$

(9) $$\frac{d}{dx}\int_{h(x)}^{g(x)} f(t)\,dt = f(g(x)) \cdot g'(x) - f(h(x)) \cdot h'(x)$$

Integration Review

Integration Formulas:

(1) $\displaystyle\int x^p\,dx = \frac{x^{p+1}}{p+1} + C, \quad p \neq -1$

(2) $\displaystyle\int \sin(x)\,dx = -\cos(x) + C$

(3) $\displaystyle\int \cos(x)\,dx = \sin(x) + C$

(4) $\displaystyle\int \sec^2(x)\,dx = \tan(x) + C$

(5) $\displaystyle\int \csc^2(x)\,dx = -\cot(x) + C$

(6) $\displaystyle\int \sec(x)\tan(x)\,dx = \sec(x) + C$

Integration Review

(7) $\int \csc(x)\cot(x)\,dx = -\csc(x) + C$

(8) $\int \frac{1}{x}\,dx = \ln \mid x \mid + C$

(9) $\int \tan(x)\,dx = -\ln \mid \cos(x) \mid + C = \ln \mid \sec(x) \mid + C$

(10) $\int \sec(x)\,dx = \ln \mid \sec(x) + \tan(x) \mid + C$

(11) $\int \sinh(x)\,dx = \cosh(x) + C$

(12) $\int \cosh(x)\,dx = \sinh(x) + C$

Integration Review

(13) $$\int e^x \, dx = e^x + C$$

(14) $$\int a^x \, dx = \frac{1}{\ln(a)} a^x + C$$

(15) $$\int \frac{1}{1+x^2} \, dx = \arctan(x) + C$$

(16) $$\int \frac{1}{\sqrt{1-x^2}} \, dx = \arcsin(x) + C$$

(17) $$\int \frac{1}{a^2+u^2} \, du = \frac{1}{a} \arctan\left(\frac{u}{a}\right) + C$$

(18) $$\int \frac{1}{\sqrt{a^2-u^2}} \, du = \arcsin\left(\frac{u}{a}\right) + C$$

Popper 23

1. $\int_0^{\pi} \sin(x)dx =$

Final Review

- 15 m/c
- 3 f/r (with multiple parts each)
- Covers ch 1-6

Email Questions from practice final and review sheet!!!