

MATH 149 HOMEWORK 21 SOLUTIONS

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Section 4.4 #48) average value =  $\frac{1}{3-1} \int_1^3 \frac{4(x^2+1)}{x^2} dx = \frac{4}{2} \int_1^3 (1+x^{-2}) dx = 2 \left[ x - \frac{1}{x} \right]_1^3 = \boxed{\frac{16}{3}}$

#86)  $F(x) = \int_0^x \sec^3 t dt \Rightarrow F'(x) = \boxed{\sec^3 x}$

#90)  $F(x) = \int_2^{x^2} \frac{1}{t^3} dt \Rightarrow F'(x) = \frac{1}{(x^2)^3} \cdot 2x = \frac{2x}{x^6} = \boxed{\frac{2}{x^5}}$

#92)  $F(x) = \int_0^{x^2} \sin \theta^2 d\theta \Rightarrow F'(x) = \boxed{(\sin x^4) \cdot 2x}$

#106)  $G(x) = \int_0^x \left[ s \int_0^s f(t) dt \right] ds \Rightarrow G'(x) = \int_0^x (s \int_0^s f(t) dt) ds = \boxed{0}$

$G'(x) = x \cdot \int_0^x f(t) dt$  and  $G'(0) = 0 \cdot \int_0^0 f(t) dt = \boxed{0}$

(product rule)  $G''(x) = 1 \cdot \int_0^x f(t) dt + x \cdot f(x) \Rightarrow G''(0) = \int_0^0 f(t) dt + 0 \cdot f(0) = \boxed{0+0=0}$

Section 4.5 #8)  $\int (x^2-9)^3 (2x) dx$  | substitute  $u = x^2-9$   $du = 2x dx$   $\int u^3 du = \text{complete}$

#12)  $\int x^2 (x^3+5)^4 dx$  |  $u = x^3+5$   $du = 3x^2 dx$   $\int u^4 \frac{du}{3} = \text{complete}$

#20)  $\int \frac{x^3}{(1+x^4)^2} dx$  |  $u = 1+x^4$   $du = 4x^3 dx$   $\int \frac{1}{u^2} \frac{du}{4} = \text{complete}$

#52)  $\int \sqrt{\tan x} \sec^2 x dx$  |  $u = \tan x$   $du = \sec^2 x dx$   $\int \sqrt{u} du$

#54)  $\int \frac{\sin x}{\cos^3 x} dx$  |  $u = \cos x$   $du = -\sin x dx$   $\int \frac{1}{u^3} (-du) = \text{complete}$

#70)  $\int t \sqrt[3]{t-4} dt$  |  $u = t-4 \Rightarrow t = u+4$   $du = dt$

$\int (u+4) u^{1/3} du$

$\int (u^{4/3} + 4u^{1/3}) du = \text{complete}$