Name: Solutions ______ / 25

There are 25 points possible on this quiz. No aids (book, calculator, etc.) are permitted. **Show all work for full credit.**

1. [4 points] Find the derivatives of the following functions.

a. $G(x) = \int_3^x \sqrt{6+5t^3}\,dt$, $G'(x) = \sqrt{6+5x^3}$

b. $H(x) = \int_4^{x^5} 8\cos\left(\frac{1}{t}\right)\,dt$, $H'(x) = 8\cos\left(\frac{1}{x^5}\right)(5x^4)$

2. [8 points] Evaluate the definite integrals below. Simplify your answer.

a. $\int_0^2 t^2(1-t)\ dt = \int_0^2 (t^2 - t^3)\,dt = \frac{1}{3}t^3 - \frac{1}{4}t^4\Big]_0^2$

$= \left(\frac{1}{3}\cdot 8 - \frac{1}{4}\cdot 16\right) - 0 = \frac{8}{3} - 4 = \frac{-4}{3}$

b. $\int_1^4 \frac{4}{x^2} + 3\sqrt{x} + 1\,dx = \int_1^4 \left(4x^{-2} + 3x^{\frac{1}{2}} + 1\right)dx$

$= -4x^{-1} + 3\left(\frac{2}{3}\right)x^{\frac{3}{2}} + x\Big]_1^4 = \left(\frac{-4}{4} + 2(8) + 4\right) - (-4 + 2 + 1)$

$= (-1 + 16 + 4 + 4 - 2 - 1) = 20$

3. [9 points] Evaluate the integrals below.

a. $\int \sin(x)\,(\cos(x))^3\,dx$ $= -\int u^3\,du = -\frac{1}{4}u^4 + C$

let $u = \cos(x)$

$du = -\sin(x)\,dx$

$-du = \sin(x)\,dx$

$= -\frac{1}{4}(\cos(x))^4 + C$

b. $\int \frac{(2+\ln(x))^2}{x}\,dx$ $= \int u^2\,du = \frac{1}{3}u^3 + C$

let $u = 2 + \ln x$

$du = \frac{1}{x}\,dx$

$= \frac{1}{3}(2+\ln(x))^3 + C$

c. $\int 5xe^{x^2+11}\,dx$ $= \frac{5}{2}\int e^u\,du = \frac{5}{2}e^u + C$

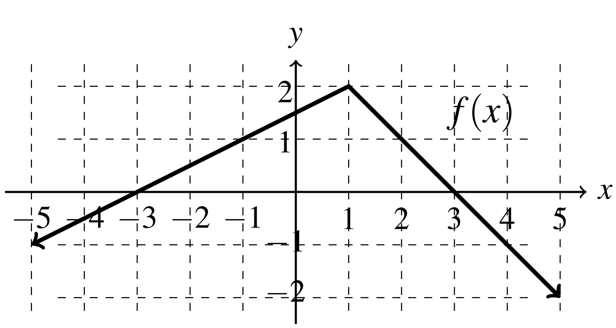
let $u = x^2 + 11$

$du = 2x\,dx$

$\frac{1}{2}du = x\,dx$

$= \frac{5}{2}e^{x^2+11} + C$

4. [4 points] Use the graph of $f(x)$ (below) to answer questions about $A(x) = \int_{-3}^{x} f(t)\,dt$.



a. $A(-1) =$ 1

b. $A(5) =$ 4

c. $A'(2) =$ 1

d. On the interval $[-3,5]$, where does $A(x)$ have a maximum?

Maximum at $x =$ 3