Student ID: _

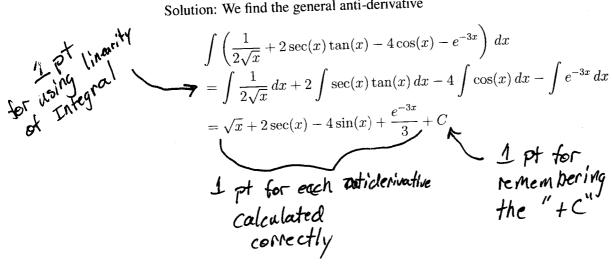
Quiz 1

Directions: You will have 30 minutes to complete this quiz. Please show all of your work and mark your answers clearly. You may not use any extra resources during the quiz: not your notes, not your book, not a cell phone, not a calculator. Good luck.

1. (6 points) Find the general anti-derivative $\int f(x) dx$ when

$$f(x) = \frac{1}{2\sqrt{x}} + 2\sec(x)\tan(x) - 4\cos(x) - e^{-3x}.$$

Solution: We find the general anti-derivative



2. (6 points) A bullet is fired at time t=1 with an initial velocity of v=400. If the bullet's acceleration is given by the function a(t) = -100t, find the velocity of the bullet as a function of time.

Solution: We know that velocity must be an antiderivative of acceleration. Therefore we begin by finding the general antiderivative of the acceleration.

$$\int a(t) dt = \int (-100t) dt = -50t^2 + C.$$
 2 pts for correct anti-derivative

Now we use the given initial condition to determine the unknown constant C.

Now we use the given initial condition to determine the unition vertical condition of
$$v(1) = -50(1^2) + C = 400$$
. $\implies C = 450$. It is fully defines the velocity as a function of time. This fully defines the velocity as a function of time.

$$v(t) = -50t^2 + 450.$$

1 pt. for writing correct function.

3. (8 points) From the book, we know that

$$\int_0^b x \, dx = \frac{b^2}{2}$$
, and $\int_0^b x^2 \, dx = \frac{b^3}{3}$.

Use these facts and the properties of definite integrals to calculate

$$\int_{1}^{2} (6x + 3x^2) \, dx.$$

(Do not use the Fundamental Theorem of Calculus, or the Evaluation Theorem)

$$\int_{1}^{2} (6x + 3x^{2}) dx = \int_{1}^{2} 6x dx + \int_{1}^{2} 3x^{2} dx \quad (\text{Rule 4: Sum \& Difference})$$

$$\text{Printerval properly} = 6 \int_{1}^{2} x dx + 3 \int_{1}^{2} x^{2} dx \quad (\text{Rule 3: Constant Multiple})$$

$$2 \text{ pto for breaking up} = 6 \left(\int_{0}^{2} x dx - \int_{0}^{1} x dx \right) + 3 \left(\int_{0}^{2} x^{2} dx - \int_{0}^{1} x^{2} dx \right) \quad (\text{Rule 5: Additivity})$$

$$Interval \text{ properly} \Rightarrow 6 \left(\frac{2^{2}}{2} - \frac{1^{2}}{2} \right) + 3 \left(\frac{2^{3}}{3} - \frac{1^{3}}{3} \right) \quad (\text{From Problem Statement})$$

$$= 6(2 - \frac{1}{2}) + 3(\frac{8}{3} - \frac{1}{3})$$

$$= 12 - 3 + 8 - 1$$

$$= 16$$

$$\text{Or rectly}$$