Instructions. (10 points) Solve each of the following problems without error. Show all details. Box in your answers. Use good notation, you will be marked off for bad notation.

(4pts) 1. \[ \int_{-2}^{1} \left( \frac{3}{2} x^2 + 6x \right) d\!x \]

Solution:
\[ \int_{-2}^{1} \left( \frac{3}{2} x^2 + 6x \right) d\!x = \left. \frac{1}{2} x^3 + 3x^2 \right|_{-2}^{1} = \left( \frac{1}{2} + 3 \right) - \left( -4 + 12 \right) = \frac{-41}{2} = -\frac{9}{2} \]

(3pts) 2. \[ \int \frac{x + 2x^{3/2} \sin(x)}{x^{1/2}} \ d\!x \]

Solution:
\[ \int \frac{x + 2x^{3/2} \sin(x)}{x^{1/2}} \ d\!x = \int x^{-1/2} + 2 \sin(x) \ d\!x = 2x^{1/2} - 2 \cos(x) + C \]

(3pts) 3. Define \( g(x) = \int_{\sqrt{x}}^{17} \frac{\sqrt{2 + 3t^2}}{t} \ dt \), compute \( g'(x) \).

Solution: We use the formula derived in class:
\[ g(x) = \int_{a}^{u} f(t) \ d\!t \implies g'(x) = f(u) \frac{du}{dx} \]

Applying this formula we see that
\[ g(x) = \int_{\sqrt{x}}^{17} \frac{\sqrt{2 + 3t^2}}{t} \ dt = -\int_{17}^{\sqrt{x}} \frac{\sqrt{2 + 3t^2}}{t} \ dt \]
\[ g'(x) = -\frac{\sqrt{2 + 3(\sqrt{x})^2}}{\sqrt{x}} \frac{d}{dx} \sqrt{x} \]
\[ = -\frac{\sqrt{2 + 3x}}{\sqrt{x}} \frac{1}{2\sqrt{x}} \]
\[ = -\frac{\sqrt{2 + 3x}}{2x} \]

Thus,
\[ g'(x) = -\frac{\sqrt{2 + 3x}}{2x} \]