1. The velocity function, in meters per second, is given for a particle moving along a curve. Find a) the displacement and b) the total distance traveled by the particle during the given time interval. $v(t) = t^2 - 2t - 8$, $1 \leq t \leq 6$

2. Evaluate the integral, if it exists, using substitution.

a) $\int (3x + x^3)^5 (1 + x^2)\, dx =$ _____

b) $\int \frac{1}{x^2} \sqrt{1 + \frac{1}{x}} =$ _____

c) $\int \sqrt{5 - 3x}\, dx =$ _____

d) $\int \csc^4 3\alpha \cot 3\alpha\, d\alpha =$ _____

e) $\int_0^{\pi/2} (\cos^3 \alpha)\sin\alpha\, d\alpha =$ _____

f) $\int \frac{\sec^2 \sqrt{x}}{\sqrt{x}}\, dx =$ _____

3. Find the general indefinite integral.

a) $\int \dfrac{2}{x^2 \sqrt{x}} dx =$ _____

b) $\int (x^2 - 2)^2 dx =$ _____

c) $\int \dfrac{\sin 2\phi}{\sin \phi} d\phi =$ _____

d) $\int (3 + \dfrac{2}{x^2} + \cos x) dx =$ _____

4. Use the Fundamental Theorem of Calculus Part I to find the derivative for the following:

a) $\int_{x}^{5} (p - \sqrt{p}) dp =$ _____

b) $\int_{2}^{\tan x} (4m + 3 \tan m)^2 dm =$ _____

5. Use the Fundamental Theorem of Calculus Part II to evaluate the integral, or explain why it doesn't exist.

a) $\int_{0}^{\pi/4} \sec x \tan x \, dx =$ _____

b) $\int_{0}^{4} x\sqrt{x}(x - 1) dx =$ _____