
HOMEWORK 10

1. Consider the function $f(x) = x^2 - 3x + 1$.
 - (a) Find an anti-derivative $F(x)$ of $f(x)$ such that $F(0) = 1$.
 - (b) Compute $\int_0^2 f(x) dx$.
 - (c) Find a point $c \in [0, 2]$ such that $f(c)$ equals the average of $f(x)$ in $[0, 2]$.

2. Compute the antiderivative of the following functions :
 - i) $f(x) = -1$
 - ii) $f(x) = \sin(x)$
 - iii) $f(x) = 4x + \sqrt{x}$
 - iv) $f(x) = \frac{3x^2+2}{x^2}$
 - v) $f(x) = 4\sqrt{x} + \sqrt[4]{x}$
 - vi) $f(x) = x^{-\frac{1}{3}} - x^{\frac{2}{3}}$
 - vii) $f(x) = \frac{14x^3+2x+1}{x^3}$
 - viii) $f(x) = 1 + \tan^2(x)$
 - ix) $f(x) = \cos^2(x) \sin(x)$
 - x) $f(x) = x \ln(x^2)$

3. Suppose that a particle moves along a straight line with acceleration $a(t) = \frac{-2t}{(1+t^2)^2}$ with $t \in [0, 1]$.
 - i) Find the velocity $v(t)$ of the particle, given that $v(0) = 1$.
 - ii) Find the distance travelled in the interval $[0, 1]$.

4. Sandra weighs 120lb. She burns $300 - 50t$ calories per hour while walking on her treadmill . Her caloric intake from drinking Gatorade is $100t$. What is her net increase/decrease in calories after walking 3 hours ?