Some Practice Problems on Sections 2.3-2.5

September 30, 2021

1. Find an equation for the tangent line to $f(x) = \sqrt{x}(x^3 - 5x)$ at $x = 2$.

2. Find an equation for the tangent line to $f(x) = \dfrac{x^3 - 3x}{x + 2}$ at $x = -1$.

3. Suppose a certain manufacturer has fixed costs \$1,800 and it costs \$30 to produce each item.

   (a) Find an equation for the cost $C(x)$ a s function of the number of items x produced.

   (b) Find an equation for the average cost $AC(x)$ and simplify.

   (c) Find the marginal average cost at $x = 30$ items and interpret your answer.

4. Find the second derivative of $f(x) = 6\sqrt[3]{x^2} - \dfrac{25}{\sqrt[5]{x^3}}$.

5. Suppose the displacement function of a moving object is $s(t) = \dfrac{t^3 + 7}{t}$ in meters, where t represents time in seconds. Find the acceleration of the object at $t = 2$ seconds.

6. Suppose the displacement function of a moving object is $s(t) = 12\sqrt[3]{t} - \dfrac{9}{\sqrt[3]{t^2}}$ in meters, where t represents time in seconds. Find the velocity of the object at $t = 8$ seconds.