Important Note:
This is NOT a thorough review for the exam. It contains only one question from each book section
to help you identify areas you should concentrate on while studying. Many more study materials
can be found on the course webpage under the "Exams" tab.

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1. Find any absolute and local extrema of $f(x) = x\sqrt{x+3}$ on $(-3, \infty)$

2. Remember that the marginal cost is the rate of change of cost. Suppose it costs 1 million dollars
   to produce 1,000 hoverboards and 2 million dollars to produce 3,000 hoverboards. What assump-
   tions do we need to make in order to conclude that the marginal cost is \$500 per hoverboard for
   some number of hoverboards between 1,000 and 3,000. Name any theorems you use.

3. Suppose the hoverboard factory from before can produce up to $10,000$ hoverboards in a year. The cost in millions of dollars to produce x thousand hoverboards is given by $C(x) = \frac{1}{2} + \frac{1}{2}x$. The revenue gained from selling x thousand hoverboards is given by $R(x) = -\frac{1}{4}x^2 + \frac{7}{2}x$. What is the maximum profit the company can make in a year?

4. Find the following limits. Be sure to show all your work.

   (a) $\lim\limits_{x \to \infty} \left(1 + \frac{5}{x}\right)^{10x}$

   (b) $\lim\limits_{x \to \infty} \left(1 + \frac{3}{x}\right)^{5}$

5. Find the antiderivatives of the following functions.

   (a) $f(x) = \dfrac{3}{x} + \dfrac{5}{x^3}$

      i. $3\ln(x) - \dfrac{5}{2x^2} + c$

      ii. $3\ln|x| - \dfrac{5}{2x^2} + c$

      iii. $-\dfrac{3}{x^2} - \dfrac{5}{x^3} + c$

      iv. $\dfrac{3}{x^2} + \dfrac{5}{x^3} + c$

   (b) $g(t) = \dfrac{3t^4 + 2t^2}{t^2}$

      i. $\dfrac{\frac{3}{5}t^5 + \frac{2}{3}t^3}{\frac{1}{3}t^3} + c$

      ii. $\dfrac{t^2(12t^3 + 4t) - (3t^4 + 2t^2)(4t^3)}{t^4} + c$

      iii. $12t^3 + 4t$

      iv. $t^3 + 2t + c$

6. The velocity of a comet was measured in kilometers per second at one minute intervals for five minutes. The results of these measurements are given in the table below. What is the approximate change in position of the comet over the five minute period?

Time (min)	0	1	2	3	4	5
Velocity (km/sec)	10	25	35	75	70	71