EXAM 4 - MATH 112 Friday, April 12

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Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. The population of a small town is now $40,000$ and t years from now will be growing at the rate of $300\sqrt{t}$ people per year. Find a formula for the population of the town t years from now. Then use the formula to estimate the population 16 years from now.

2. A country's annual exports will be $E(t) = 40e^{0.2t}$ and its imports will be $I(t) = 20e^{0.1t}$ both in millions of dollars per year, where t is number of years from now. Find the accumulated trade surplus (exports minus imports) over the next 10 years.

3. Compute the indefinite integrals

(a) $\int x^3 \sqrt{x^4 - 1}\, dx$

(b) $\int \frac{(1 + \sqrt[3]{x})^2}{\sqrt[3]{x^2}}\, dx$

4. Find the area under the graph of the function $f(x) = \dfrac{x + 6}{\sqrt{x^2 + 12x + 4}}$ from $x = 0$ to $x = 3$.

5. Find the area of the region that is bounded by the graphs of the functions $f(x) = x^3 - 3x^2$ and $g(x) = x - 3$.