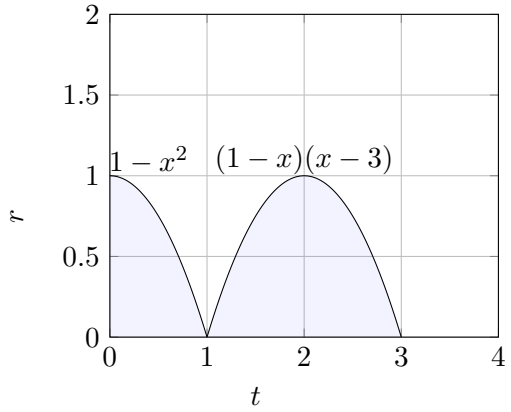
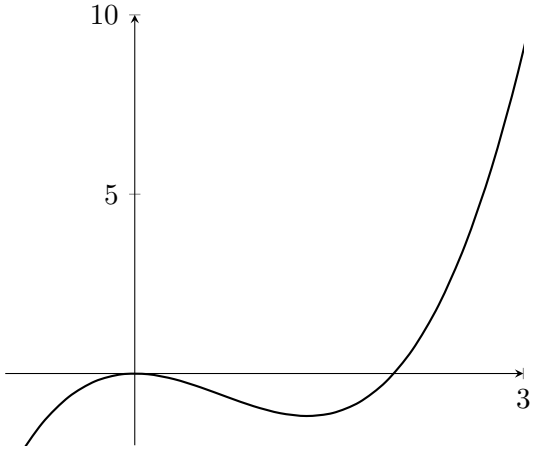
MA131 Test 4 Practice Problems

1. Find the following integrals:
   (a) $\int(6x^3 + 4x^2 + 4x + 3)dx$
   (b) $\int 2e^{-0.4x}dx$
   (c) $\int \frac{1}{2x}dx$
2. Find the following integrals:
   (a) $\int \frac{5x^4}{x^5+1}dx$
   (b) $\int(-x^{-2})\left(\frac{1}{x} + 2\right)^5 dx$
   (c) $\int \frac{2}{x+4}dx$
3. Find $\int_0^3 f(x)dx$, where $f(x)$ is shown:



4. Consider the functions $f(x) = x^3 - 2x^2$. Find the area bounded by the graph of $f(x)$ and the x-axis between $x = 0$ and $x = 3$. You may use the following graph as a reference, but you must show all of the work needed to determine any values associated with the function and its graph.



5. Water is pumped out of a reservoir to provide water for a community at a constant rate of $2,000$ gallons per day. In addition, after a heavy rain, rainwater flows into the reservoir. The rate (in thousands of gallons per day) at which the water flows into the reservoir t days after the rain stops is given by $I(t) = 10e^{-0.25t}$. The graph of $I(t)$ and the constant function 2 are shown below. What quantity does the area between these curves between $t = 0$ and $t = 4$ represent?