1. Find the following:

(a) \( \int \frac{1}{2x^2 - 3x - 2} dx \)  
(b) \( \int \frac{x + 3}{5 + 4x - x^2} dx \)  
(c) \( \int \frac{4x^2 + x - 8}{x^3 - 3x^2 - 4x} dx \)

2. Find the following:

(a) \( \int \frac{2x^4 + 3x^3 + x - 5}{x^2 + x - 2} dx \)  
(b) \( \int \frac{x^5}{x^4 + 1} dx \)  
(c) \( \int \frac{x^2}{x^6 - 1} dx \)

3. An engineer is testing a new faucet design. During the test, the engineer measures the flow rate of the faucet to be \( r(t) = \frac{e^t}{e^{2t} + 3e^t + 2} \) gallons per minute, where \( t \) measures the time (in minutes) since the test began. If the test lasts \( \ln(20) \) minutes, determine how many gallons of water are used in the test. Write your answer as a single logarithm.