

**Instructions:** This quiz is closed book, closed note, and an individual effort. Electronic devices other than approved calculators are not allowed on your person (e.g., no cell phones or calculators with CAS). Answer each question. **Show all work to receive full credit.** Unless the question specifies, you may provide either an exact answer or round to two decimal places. If you get stuck, please attempt to explain what you want to do. This may give more partial credit.

1. (2 points each) Evaluate the following integrals (Please note some are definite and some are indefinite).

(a)  $\int dx$

(b)  $\int_{-e}^{-1} \frac{1}{x} dx$

(c)  $\int_0^3 4x^5 + 5x^4 - 4x^3 + 7x^2 + x - 20 dx$

(d)  $\int e^{7x} dx$

(e)  $\int \frac{2}{3\sqrt{x}} dx$

(f)  $\int_{-2}^2 12x^3 + 8x dx$

2. (4 points) Let the following equation be the rate,  $r(t)$ , in millileters per day at which a tree can absorb water with a fixed energy supply.

$$r(t) = \sqrt{x}$$

- (a) Determine what the equation for the amount of water absorbed by the tree is in terms of  $t$  days given after 9 days the plant absorbed 30 millileters of water.

- (b) If instead we had  $r(t) = 2$ , what kind of function would the amount of water absorbed by the tree in terms of  $t$  days be? If the tree started with no water, what is the function?