

Name: _____

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Circle one: Faudree (F01) | Bueler (F02) | VanSpronsen (UX1)

25 points possible. **No aids (internet, other students, book, calculator, etc.) are permitted.**You do not need to simplify final answers, but **answers without supporting work will lose points for completeness and effort.**1. [8 points] Consider the curve $y = 3\sqrt{x}$ on the interval $0 \leq x \leq 4$.

a. Sketch a graph of this curve.

b. Give a rough estimate of the area beneath the curve. **Explain** in words the approximation you are using, **and** sketch this estimate on top of your sketch above.

c. Find the exact area.

2. [5 points] Evaluate the integral.

$$\int_0^1 x^\pi + e^x dx =$$

3. [6 points] A honeybee population starts with 100 bees and increases at a rate of $n'(t)$ bees per week.

a. What does the integral $\int_0^7 n'(t) dt$ represent? (*Explain in a few words.*)

b. What does $100 + \int_0^7 n'(t) dt$ represent? (*Explain in a few words.*)

4. [6 points] Let $F(x) = \int_2^x \cos(\pi t^2) dt$. Find an equation of the tangent line to the curve $y = F(x)$ at the point where $x = 2$.