

MA 121 Summer I 2007

Test 3 Copy C

Name Key

Show your work on the test page or scrap paper. Each problem is worth ten points. Simplify your answers as much as possible.

- In 1995 Apex had a population of 5000 and in 2000 Apex had a population of 8000. Assuming the uninhibited growth model, find a function representing the population of Apex t years after 1995. Estimate the population of Apex in 2010. $P(t) = 5000e^{.094t}$, **P(15)=20480**
- Find the present value of a \$10000 savings bond due in 10 years that gets 3.5% interest compounded continuously. **\$7046.88**
 - If a radioactive element has a half-life of 2500 years, how many years does it take for the element to lose 65% of its original amount? **3786 years**
- Find $f'(x)$ for
 - $f(x) = x2^x$
 $f'(x) = 2^x + x2^x(\ln 2)$
 - $f(x) = \log_7(x + 5)$
 $f'(x) = \frac{1}{(\ln 7)(x+5)}$
- Let $f'(x) = 2x - 4 + \frac{5}{x}$.
 - Find $f(x)$.
 $f(x) = x^2 - 4x + 5\ln(x) + C$
 - Find $f(x)$ if $f(1) = 4$.
 $f(x) = x^2 - 4x + 5\ln(x) + 7$
- Let $f(x) = 6x^2 - 5$.
 - Find $\int f(x)dx = 2x^3 - 5x + C$
 - Compute $\int_1^3 f(x)dx = 42$
 - Find the average value of the function $f(x)$ over the interval $[1, 3]$. **21**

6. Compute the following integrals.

(a) $\int (2x - 3)e^{x^2 - 3x - 4} dx = e^{x^2 - 3x - 4} + C$

(b) $\int_4^6 (2x - 3)e^{x^2 - 3x - 4} dx = e^{14} - 1$

7. Compute the following integrals.

(a) $\int \frac{4}{x^3} dx = -\frac{2}{x^2} + C$

(b) $\int_1^{\infty} \frac{4}{x^3} dx = 2$

8. Find the area of the region bounded by $y = 12x - 5$ and $y = 6x^2 - 5$. **8**

9. Suppose a company sells widgets with a supply function given by $S(x) = 3x + 3$ and a demand function of $D(x) = -6x + 21$.

(a) Find the equilibrium point. **(2, 9)**

(b) Find the Consumer's surplus. **12**

10. Find the volume of the shape generated by rotating $y = 5x^2$ from $x = 0$ to $x = 1$ around the x -axis. **5π**