

QUIZ #4 (SAMPLE QUESTIONS)

Show all work, simplify as appropriate, and use “good form and procedure” (as in class).

Box in your final answers; write units where appropriate!

No notes or books allowed.

USE A SCIENTIFIC CALCULATOR!

1) Find the derivatives. Simplify where possible. (19 points total)

a) $D_x \left[\ln(x^3 + 5)^4 \right]$ (7 points)

b) $D_x \left(3e^{4x^2+x} \right)$ (4 points)

c) $D_x \left(x^2 e^{6x} \right)$ (6 points)

d) $D_x \left(e^8 \right)$ (2 points)

2) If $f(x) = x \ln x$, find $f'(e)$. Do not approximate. (8 points)

3) Find the integrals. Simplify wherever possible. (33 points total)

a) $\int (4x^3 - 10x + 7) dx$ (6 points)

b) $\int \left(\sqrt[4]{x} + \frac{3}{x^4} \right) dx$ (7 points)

c) $\int (x + 3)^2 dx$ (7 points)

d) $\int e^{-4x} dx$ (3 points)

e) $\int \frac{4}{5x} dx$ (4 points)

f) $\int (3 + 3w^{-1} + 3w^{-2}) dw$ (6 points)

- 4) A deposit of \$4000 compounded continuously at 3% interest will grow to $V(t) = 4000e^{0.03t}$ dollars after t years. Find the rate of growth after 6 years. Round off to two decimal places and write units. (7 points)

5) The population of Fredonia is given by $P(t) = t^2 + 4t$, where t is the number of years from now. Find the relative rate of change of the population 10 years from now. Round off your answer to the nearest percent per year. (8 points)

6) There is an epidemic of Rage virus in a city. The rate of growth of the epidemic after t days is given by $12e^{2t}$ new cases per day ($0 \leq t \leq 7$). At time $t = 0$, there were 10 cases. (23 points total)

a) Find a formula for the total number of cases of Rage virus in the first t days. (10 points)

b) Use part a) to find the total number of cases in the first 4 days. Round off to the nearest integer. (3 points)

c) After how many days will there be 100,000 cases? Round off to the nearest tenth of a day. Show all steps, as we have done in class. (10 points)

7) True or False: If M and N are positive in value, $\ln MN = \ln M \cdot \ln N$. Circle one:
(2 points)

True

False