Math 256 - Applied Differential Equations **Suggested Homework/Exam Prep.**

These selected exercises are from our text (Elementary Differential Equations with Boundary Value Problems, by *Trench*). These are excellent problems to study in preparation for the midterms/final (many of the exam problems will also be *extremely similar* to these).

Midterm:

1.2: $2, 4, 6$

1.3: $4, 6, 9$

2.1: $2, 4, 6, 16, 20, 22$

2.2: $4, 6, 12, 18, 20, 28$

2.3: $2, 6, 10$

2.4: $2, 4, 10, 16, 18, 22, 26, 28, 40, 42$

2.5: $1, 2, 8, 16, 22, 30$

2.6: $6, 8, 13$

4.1: $12, 19, 20$

4.2: $8, 9, 11, 12, 14$

4.3: $2, 4, 10, 16$

5.1: $5, 8$

5.2: $1, 4, 8, 10, 14, 20$

AND the exercises at the end of this document!

For final (which is cumulative):

5.3: $1, 2, 4, 8, 12, 16, 24, 33$.

5.4: $4, 8, 18, 28$.

5.5: $4, 8, 22, 28, 32$.

5.6: $2, 8, 22, 28$.

7.4: $1, 2, 3, 5, 7, 10, 14$

5.7: $1, 4, 7, 10, 14, 28$.

6.1: $2, 3, 6, 11, 15, 19, 21$

6.2: $1, 6, 11, 15, 17, 21, 24$

6.3: $2, 4, 7, 9$

8.1: $1, 2, 6, 8$

8.2: $2, 4, 6$

8.3: $2, 6, 10, 16, 20, 36$

8.4: $2, 8, 14, 20, 24$

8.5: $4, 10, 18$

8.6: $2(a), 2(b), 2(c), 2(d), 3, 5(a), 5(e), 7$

8.7: $3, 6, 8, 12, 20$

3.1: $2, 4$

These are part of Suggested Homework for exam 1:

Find and classify the equilibrium solutions for the differential equations (1) through (6):

(1) $y' = 3 - y$

(2) $y' = 5 + y$

(3) $y' = y^2(3 - y)$

(4) $y' = y^2 - 5y + 6$

(5) $y' = (1 - y)(y - 2)(y - 3)$

(6) $y' = y - y^3$

(7) Show that for the logistic equation, $\dfrac{dy}{dt} = ry\left(1 - \dfrac{y}{K}\right)$, that the steepest ascent occurs at $y = \dfrac{K}{2}$.

(8) Let r, K be positive constants. Consider the IVP $\dfrac{dy}{dt} = ry \ln\left(\dfrac{K}{y}\right)$, $y(0) = y_0$.

(a) Find and classify the equilibrium solutions.

(b) Solve for y.