Elementary Differential Equations–Math 240
Exam 1–Summer 2005
June 17,2005

Name:

Instructor:

Please show all work.Answers with no work will receive on credit.No calculators or notes are allowed to use for this exam.

(1) (10 pts) Solve the following differential equation(Answer may be left in implicit form).

$$\frac{dy}{dx} = y^2 - 5y - 6$$

(2) (10 pts) Solve the following differential equation (Answer may be left in implicit form)

$$12e^{4x} + 2xy^2 + (2x^2y - 2cos(y) + 3)\frac{dy}{dx} = 0$$

(3) (15 pts) Solve the following Initial Value Problem (Answer may be left in implicit form)

$$\frac{dy}{dx} + (\frac{3}{x})y = 7x^3, \qquad y(1) = 2$$

(4) (15 pts) Solve the following differential equation (Answer should be in explicit form)

$$\frac{dy}{dx} + (\frac{2}{x})y = 3x^4y^2$$

(5) (15 pts) Solve the following differential equation (Answer may be left in implicit form)

$$\frac{dy}{dx} = \frac{2y - 3x}{2x - y}$$

(6) (15 pts) A population model satisfies

$$\frac{dP}{dt} = -P(P-2)(P-4)$$

(a) What are the Equilibrium points of the population model?

(b) Without solving,graph several solution curves of the differential equation.

(c) Classify the equilibrium points as stable,unstable or semi-stable.

(d) What is the **Threshold** of the population?

(e) What is the **Carrying Capacity** of the population?

(f) Given $P(0) = 2.5$ find:

$$\lim_{t \to \infty} P(t) =$$

(7) (20 pts) Compute the following:

(a) $(1+3i)e^{\frac{i\pi}{6}}$

(b) $\mid 6+8i \mid$

(c) $arg(12e^{-i\frac{\pi}{4}})$

(d) $\frac{(3+2i)}{(2i+1)}$