

### REVIEW QUESTIONS FOR EXAM 3

MATH 230, Section AL1, Spring 2006

1. Sketch the graph of the equation  $x^2 + 2y^2 - 2x + 8y + 8 = 0$ . Find its center, foci and vertices.
2. Sketch the graph of the equation  $y^2 - 6y + 4x + 5 = 0$ . Find its focus and vertex.
3. Find an equation of the hyperbola with foci  $(0, \pm 3)$  and vertices  $(0, \pm 2)$ .
4. Find an equation of the ellipse with foci  $(0, \pm 4)$  and eccentricity  $\frac{2}{3}$ .
5. Find the Taylor polynomial  $P_n(x)$  of the indicated degree  $n$  and the remainder term  $R_n(x)$ , for  $a = 0$ .

$$f(x) = \frac{1}{1 - x^2}, n = 3$$

6. Find the Taylor series of the given function at the indicated point  $a$ .

$$f(x) = \frac{1}{(1 - x)^2}, a = 0$$

7. Find the interval of convergence of each of the power series below.

$$\sum_{n=1}^{\infty} \frac{n^2 x^n}{3n - 1}$$
$$\sum_{n=1}^{\infty} \frac{(2x - 1)^n}{n^4 + 16}$$

8. Use power series to approximate the value of the following integral accurate to 4 decimal points.

$$\int_0^1 \sin(x^2) dx$$

9. Use power series to evaluate the following limit.

$$\lim_{x \rightarrow 0} \frac{x - \sin x}{x^3 \cos x}$$

Answers:

1. ellipse with center  $(1, -2)$ , vertices at  $(2, -2)$ ,  $(0, -2)$ , and foci at  $(1 \pm \frac{1}{2}\sqrt{2}, -2)$
2. parabola with vertex at  $(1, 3)$  and focus at  $(0, 3)$
3.  $\frac{y^2}{4} - \frac{x^2}{5} = 1$
4.  $\frac{x^2}{20} + \frac{y^2}{36} = 1$
5.  $P_n(x) = 1 + x^2$ ,  $R_n(x) = \frac{24(5z^4 + 10z^2 + 1)}{4!(1-z^2)^5} x^4$
6.  $\sum_{n=0}^{\infty} (n+1) x^n$
7.  $(-1, 1)$ ,  $[0, 1]$
8. 0.3103
9.  $\frac{1}{6}$