Formula Sheet for the Final Exam

1. **Circle**: $(x-h)^2+(y-k)^2=r^2$

2. **Parabola** (Quadratic function): $y=f(x)=a(x-h)^2+k$
   or $f(x)=ax^2+bx+c$ where $h=-\frac{b}{2a}$, $k=f(h)$ or $c-\frac{b^2}{4a}$

3. **Distance** formula: $d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

4. **Quadratic formula**: $x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

For the following formulas: S is future value, P is present value, r is the annual interest rate, k is the number of compounding periods in a year, t is time in years, A is the amount of money, and R is the amount of payment; with the formula for the periodic interest rate $i=\frac{r}{k}$.

5. **Future Value** of an Investment with **continuously compounded** interest: $S=Pe^{rt}$
   (The amount at the end of an investment when an amount P is allowed to grow with interest compounded continuously.)

6. **Future Value** of an Investment: $S=P(1+i)^{kt}$
   (The amount at the end of an investment when an amount P is allowed to grow.)

7. **Present Value** of an Investment: $P=S(1+i)^{-kt}$
   (The amount that must be invested now to provide for a future value.)

8. **Effective Rate of Interest**: $E=(1+i)^k-1$
   (The effective rate for an account.)

9. **Future Value** of an Annuity: $S=R\left[\frac{(1+i)^{kt}-1}{i}\right]$
   (The amount at the end for an ordinary annuity with regular payments.)

10. **Present Value** of an Annuity: $P=R\left[\frac{1-(1+i)^{-kt}}{i}\right]$
    (The present value of an ordinary annuity with regular payments.)

11. **'Sinking Fund' Payment** for an Annuity: $R=\frac{Si}{(1+i)^{kt}-1}$
    (The amount of a payment that will provide a future value of an ordinary annuity.)

12. **Amortization Formula** (Installment Payments): $R=A\left[\frac{i}{1-(1+i)^{-kt}}\right]$
    (The amount of an installment payment when the amount borrowed is A.)