

Appendix E:**GRADE 9 FINAL EXAM****JUNE 1998**

INSTRUCTIONS: Give all answers exact, unless otherwise instructed in the question. If a particular methodology is asked for in a question, credit will be awarded only if the method is employed.

Show all working out. Follow the directives given in class for documenting your answers when you use the TI-92. Highlight your answers clearly.

An incorrect answer will receive possible part credit only if the working out is shown.

1. Find the discriminant of each quadratic expression below, and hence describe the nature of its roots:
(a) $x^2 - 2x + 1$ (b) $2x^2 - 2x + 3$ (c) $x^2 - x - 1$
2. Find the roots of the following expression using the method “completing the square”:
 $x^2 - 2x - 5 = 0$
3. (a) Find the equation of the line passing through the points A(2,-3) and B(-1,-4)
(b) Find the equation of the perpendicular bisector of line segment AB, i.e., the line perpendicular to AB and passing through the midpoint of AB.
(c) Find the length of AB.
4. Write the period and amplitude of the function $y = 8 \cos 1.25 x$, and sketch its graph for $0 \leq x \leq 2\pi$.
5. Find the values of p for which : $px^2 + 4x + (p - 3) = 0$ has equal roots.
6. Find all the values of x in the interval $0 \leq x \leq 2\pi$ for which:
(a) $\cos 3x = -1$ (b) $\tan 0.5 x = -\frac{\sqrt{2}}{2}$
7. (a) Define a radian.
(b) How many radians are in 360 degrees?
(c) Write an equation for converting degrees to radians.
(d) Rewrite this equation to convert radians to degrees, and use it to find the number of degrees in 1.3 radians.

8. List the first five terms of each sequence below. Identify each as an A.P., G.P., or neither, stating clearly your reasons.

(a) $u_n = 95 - 9(n - 1)$

(b) $u_n = 8 - 2^n$

(c) $u_n = 2^{-n}$

(d) $u_n = \left(1 + \frac{2}{n}\right)^n$

9. For each sequence given below, state, with reasons, whether it converges or diverges. Sketch a recurrence graph for each.

(a) $u_n = u_{n-1}^2 - 1; u_1 = 2$

(b) $u_n = \frac{1}{u_{n-1}}; u_1 = -2$

(c) $u_n = \frac{1}{u_{n-1} - 3}; u_1 = 1$

10. Write the first three and last term, and find the sum of:

(a) $\sum_{r=1}^8 3 \cdot 2^r - 1$

(b) $\sum_{r=-6}^{-1} \frac{1}{2r + 1}$

11. Write the following series in Σ notation, and find its sum:

(a) $8 + 4 + 0 - 4 - 8 \dots -80.$

(b) $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \dots$

12. Solve the following systems of equations, documenting your procedures:

$$\begin{aligned} 3.2x + 1.6y &= 8.64 \\ 5.4x - 4.8y &= -6.42 \end{aligned}$$

13. (a) Can the quadratic equation $y = x^2 + x - 4$ have integer values for roots? Explain clearly.
(b) Using the Tbl Set and TABLE functions of the TI-92, estimate the roots to the nearest 0.001.
(c) Graph the above function, and using the TRACE function of the TI-92, find the roots to the nearest 0.001. Sketch the graph on your answer page.
(d) Enter the sequence of steps you would use on the TI-92 to check your answers to the above with the SOLVE function of your calculator, and write the solutions shown on your screen.
14. The three sides of a right triangle are expressed by x , $x+3$, and $x+6$. Using the Pythagorean Theorem, write an equation in x , and find the three sides.