

MPS22 – Precalculus  
Final Exam Review Sheet

The final exam will consist of 8 problems similar to those below.

You must choose any 5 of these 8 problems. Each problem is worth 20 points.

(Note: You must complete all parts of the problems you select in order to earn full credit.)

1.
  - (a) Find the time required for an investment of \$5,000 to grow to \$8,000 at an interest rate of 7.5% per year, compounded quarterly.
  - (b) Solve for  $x$ :  $\ln(x+1) - \ln 8 = 2$
  - (c) Expand:  $\ln\left(\frac{4x^2}{y^3\sqrt{z}}\right)$
  
2.
  - (a) Write an equation of the parabola whose focus is  $(2, -1)$  and with directrix  $x = -4$ .
  - (b) Find the 6<sup>th</sup> roots of  $32\sqrt{2} - 32i\sqrt{2}$  in trigonometric form.
  
3.
  - (a) In a geometric sequence  $a_5 = 243$  and  $a_9 = 3$ . Find  $a_1$  and find an explicit formula for  $a_n$ .
  - (b) Find  $a_4$  given the recursively defined sequence below:  
$$a_1 = 5$$
$$a_{k+1} = a_k + 4$$
  
4.
  - (a) Find the six trigonometric functions of the angle  $\theta$  (in standard position) whose terminal side passes through the point  $(5, -2)$ .
  - (b) Sketch the angle  $-390^\circ$  in standard position and state one positive and one negative coterminal angle.
  
5.
  - (a) Write the equation of a sine curve with period  $20\pi$ , amplitude 7, and with a minimum value of  $-2$ .
  - (b) Find the exact value of  $\cos\frac{17\pi}{3}$  in simplest radical form.
  
6.
  - (a) List all the *possible* rational roots of  $f(x) = 7x^3 - 11x^2 - 3x + 4$ .
  - (b) Use synthetic division to find all of roots in simplest radical form.
  
7. Solve for all values of  $x$  on the interval  $0 \leq x < 2\pi$ :  $\cos 2x - 1 = 3\cos x$
  
8.
  - (a) Plot the point  $\left(3, \frac{7\pi}{6}\right)$  on the polar plane below.
  - (b) State *two* other sets of polar coordinates that represent the point  $\left(3, \frac{7\pi}{6}\right)$  where  $r < 0$ .
  - (c) Find the exact rectangular coordinates of the point  $\left(3, \frac{7\pi}{6}\right)$ .

