

Math 101 Fall 2004 Exam 1

1. (10 points) Ahmet Bey buys 8-month government bonds with maturity value of 11000 YTL for 9900 YTL. In need of cash, he sells the bonds to Mehmet Bey for 9600 YTL after two months. What are the annual interest rates for Ahmet Bey, Mehmet Bey, and the government?

2. A line with y-intercept 1 passes through the points $(-1, 3)$ and $(2, -3)$.
- (a) (7 points) What is the equation of the line ?

(b) (3 points) What is the x-intercept ?

(c) (5 points) At what point does this line intersect the line $y = x$?

3. Answer the following questions.

a) (5 points) In triangle ABC , angle $A = 30^\circ$, angle $B = 45^\circ$, and $b = 3\sqrt{2}$. Find a .

b) (8 points) Find the sine and cotangent of the angles θ in $[0, 2\pi]$ for which $\cos \theta = -1/2$.

c) (7 points) Find $\tan(\frac{\pi}{8})$.

4. Answer the following questions.

a) (6 points) Solve the equation $\log_4(x + 4) - 2\log_4(x + 1) = \frac{1}{2}$ for x .

b) (7 points) Graph $y = 2 \ln(x + 3)$ indicating the intercepts.

c) (5 points) Write the above equation in an exponential form.

5. a) (6 points) Write the domain and the range of $f(x) = \sec x$. Sketch the graph of $y = \sec x$ on $[-2\pi, 2\pi]$.

b) (7 points) Write the domain and the range of $f(x) = \operatorname{arcsec} x (= \sec^{-1}x)$. Sketch the graph of $y = \operatorname{arcsec} x$. What is the y -coordinate when x is $\sqrt{2}$?

c) (4 points) Find $\arctan(-\frac{1}{\sqrt{3}})$.

6. a) (8 points) Put the equation $y = \frac{1}{2}x^2 - 2x + \frac{3}{2}$ in the form $y = a(x - h)^2 + k$ by completing the square. Find the vertex and write the equation for the axis of symmetry.

b) (12 points) Sketch a graph of $f(x) = \frac{2x-3}{1-4x}$ on $[-5, 5]$ by indicating all asymptotes and intercepts and showing at least 4 points on the graph with their coordinates.