

MATH 34A MIDTERM REVIEW

I. Algebra

1. Multiply out and combine like terms: $(a + b)(2a + b)(a - 2b)$.
2. Solve for x in terms of a and K :

$$\frac{3a + 2x}{4 - Kx} = 5.$$

3. Solve for x and y in terms of a and b :

$$3x + 2y = 3a \text{ and } x + y = 2a - b.$$

4. Solve for y in terms of n :

$$y - \frac{y^2 + 3y}{y + 2} = n.$$

5. Solve for x in terms of c and d : $c(3 + x)^{-1} - 5(d + 2x)^{-1} = 0$.
6. Find 25% of 60% as a percentage.
7. Find $\frac{5}{6}$ of 10% as a fraction.
8. What is $\frac{2}{3}$ of 45% of 125?

II. Functions and Graphs

1. Let $f(x) = -6x + 1$. Find $f^{-1}(3)$. Find $f^{-1}(x)$.
2. Let $f(x) = 2x^7 + 9$. Find $f(1)$ and $f^{-1}(9)$. Find $f^{-1}(x)$.
3. Let $f(x) = 3e^{x-1} - 2$. Find $f^{-1}(1)$. Find $f^{-1}(x)$.
4. Show the the inverse function of $f(x) = \frac{x-2}{x-1}$ is itself. (Hint: Just work out what the inverse function is and see that it is the same as $f(x)$.)
5. A particle is traveling on the x -axis and its position-time graph is shown below.

- a) What is the initial position of the particle? (i.e. Where is it when at $t = 0$?)
 - b) What is its speed at $t = 1$?
 - c) During what time interval is the speed of the particle greatest? What is its speed during this time? What is its velocity?
6. A particle is traveling on the x -axis and its velocity-time graph is shown below.

- a) What is the total distance traveled by the particle over the time period $[0, 5]$?
- b) If at $t = 0$ the particle is at the point $x = 3$, where would it be at when $t = 5$?

7. The graphs of two functions $y = f(x)$ and $y = g(x)$ are shown below. If $h(x) = g(f(x))$, use the graphs to $h(1)$ and $h(4)$. Also, find all the possible solutions of the equation $h(x) = 3$ for $0 \leq x \leq 5$.

III. Word problems

1. I have two cans of paint. Can A contains 10% of blue and 90% yellow. Can B contains 80% blue and 20% yellow.

a) If I mix 2 liters from can A with x liters from can B, what is the percentage of blue in the result?

b) How much paint from can B should I mix with 2 liters from can A to get paint which is 60% blue?

2. Solution A contains 5% salt. Solution B contains 20% salt. How much solution A do you combine with 3 liters of solution B, to obtain a result containing 10% salt?

3. A square has 7 times the area of a circle of radius R . Express the length of the perimeter of the square in terms of R .

4. sports field is to have the shape of a rectangle with semi circles put on the two ends. It must have a perimeter of 1000m. Express the area enclosed in terms of the diameter of the semi-circular ends.

5. Car A leaves San Diego at noon driving at 60mph along a route which is 400 miles long to San Francisco. Car B leaves San Francisco 2 hours later traveling along the same route at 80mph. How far from the midpoint of the route are they when they meet? Are they closer to San Diego or to San Francisco?

6. A fighter plane F is told to intercept plane X which is 100 miles in front of F flying directly away from F at 500mph. Plane F is told it must intercept X in 6 minutes. How fast should F fly?

7. Which number gives the same result when you subtract 5 as when you divide by 5?

IV. Useful formulae

You should look these up yourself.

1. Area of rectangle=
2. Perimeter of rectangle=
3. Area of triangle=
4. Area of trapezoid=
5. Volume of a rectangular block=
6. Surface area of a rectangular block=
7. Area of circle=
8. Perimeter of circle=
9. Volume of cylinder with circle base=
10. Surface area of cylinder with circle base=
11. Volume of sphere=
11. Surface area of sphere=