

Midterm Exam III

Fall 2013, MAT172 Section B401[19441]

December 5th, 2013. 9:00AM–10:40AM.

Instructions: Print your name on the exam booklet. This exam is closed-book and closed-note. You cannot use any electronic device in this exam. You are not allowed to talk to other students. Write all details explicitly. Answers without justifications and/or calculation steps may receive no score. Hand-in blue booklet only. Bring the exam papers next time. We will go over these together.

- 1.(Sample Final I-1) Let $f(x) = x - 3$ and $g(x) = x^2 - 9$. Specify the domain of $f(x)/g(x)$.(4 points)
- 2.(Sample Final I-2) Draw the graph of $y = 4 \cos 2x$ from $x = 0$ to $x = 2\pi$.(4 points)
- 3.(Sample Final I-3) Draw the graph of $y = -1 + |x - 3|$.(4 points)
- 4.(Sample Final I-4) Write an equation of the line passing through $(1, 1)$ and perpendicular to the line $y = -\frac{1}{2}x + 1$. Sketch its graph.(4 points)
- 5.(Sample Final I-5) Draw the graph of $y = 3x^2 + 6x + 1$ and label its minimum.(4 points)
- 6.(Sample Final I-6) Draw the graph of $y = \sqrt{x - 4}$.(4 points)
- 7.(Sample Final I-7) In triangle ABC , side $a = 2$, side $b = 3$, and $\angle C = 60^\circ$. Find the length of side c . Leave your answer in radical form.(4 points)
- 8.(Sample Final I-8) Write an equation of the line given the graph in Figure 1.(4 points)
- 9.(Sample Final I-9) Write an equation of the parabola given its graph in Figure 2.(4 points)
- 10.(Sample Final I-10) Let $f(x) = 500e^{0.1x}$. Write the inverse of f and specify its domain.(4 points)
- 11.(Sample Final I-11) Let $f(x) = 3x + 1$. Compute and simplify the difference quotient given by $\frac{f(x+h)-f(x)}{h}$.(4 points)
- 12.(Sample Final I-12) If $\sin x = \frac{3}{5}$ and x is an angle in Quadrant II, find the value of $\tan(x)$.(4 points)
- 13.(Sample Final I-13) State the formula for $\sin(a+b)$ and use it to show $\sin(a + \frac{\pi}{2}) = \cos a$.(4 points)
- 14.(Sample Final II-3) Draw the graph of $f(x) = \frac{3x^2}{x^2-9}$. Indicate asymptotes.(6 points)

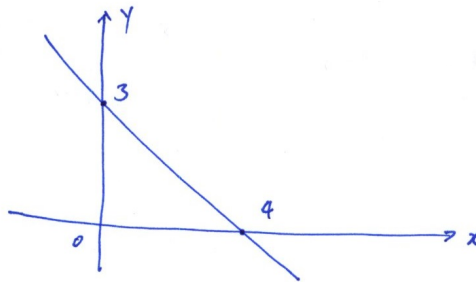


Figure 1: Problem 8

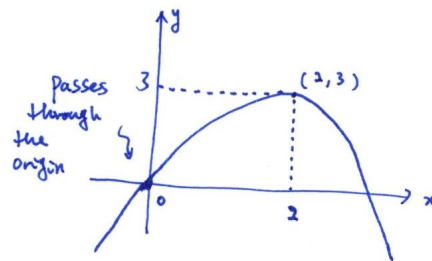


Figure 2: Problem 9

15.(Sample Final I-15) Draw the graph of $F(x)$ where $F(x) = 2x - 1$ when $x \geq 2$, and $F(x) = 1 - 2x$ when $x < 2$.(6 points)

16.(Sample Final I-16) Mary owns 200 shares of Flybinite Enterprises that are worth \$75 apiece. Each year Mary holds them, she gets 5 free shares but the value of each share Mary has decreases by \$2. How many years should Mary hold these shares to maximize their total value? What's the maximum value?(8 points) *Hint:* Notice that one should regard negative time and negative total value as which do not make sense. What does it mean if the maximum occurs in negative time? When Mary should sell her shares then?

17.(Sample Final I-17) The half-life of Joannium is 3 days. A sample consists of 60 grams.

(1) How much remains after 12 days? (Just give a formula. You don't need to compute exact value.)(2 points)

(2) How much remains after t days?(3 points)

(3) In how many days will 50 grams have decayed? (Just give a formula. You don't need to compute exact value.)(3 points)