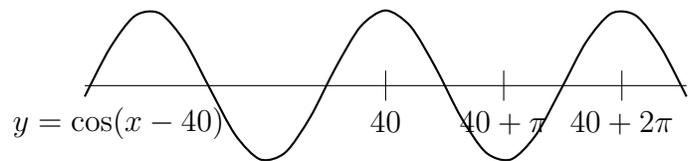
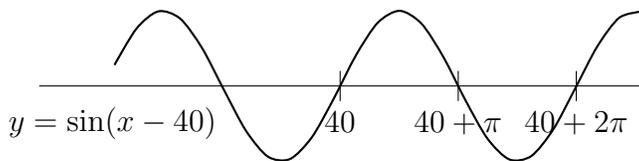


Math 105, Section 204, Quiz 8

Wednesday, March 28

Communicating mathematics is an important skill to practice, so
simplify and justify all answers unless otherwise directed.

Show your work, and use proper notation.



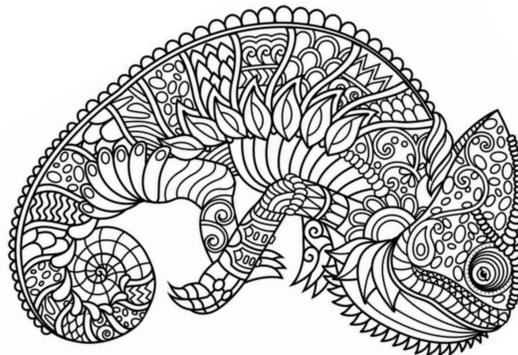
For a continuous random variable X with probability density function $f(x)$:

$$\mathbb{E}(X) = \int_{-\infty}^{\infty} x f(x) dx \quad \text{Var}(X) = \int_{-\infty}^{\infty} (x - \mathbb{E}(X))^2 f(x) dx = \mathbb{E}(X^2) - [\mathbb{E}(X)]^2 \quad \sigma(X) = \sqrt{\text{Var}(X)}$$

If you finish early, it's kind to your classmates to sit quietly while they work, so they are not distracted. If you find yourself bored, think about this review problem:

Evaluate $\frac{d^2}{dx^2} \int_{-x}^x e^{t^2} dt$

Alternately, if your brain is finished for the day, colour in this pretty picture:



1. Calculate the expected value (mean) of the continuous random variable X with probability density

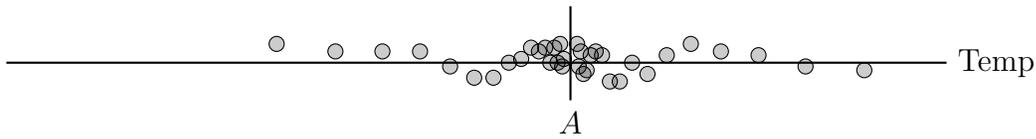
$$f(x) = \begin{cases} \frac{1}{2}(x+1) & -1 \leq x \leq 1 \\ 0 & \text{otherwise} \end{cases} \quad \text{As usual, simplify your answer.}$$

5

2. The temperature of a tank is modelled by the probability density function (PDF)

$$f(x) = \begin{cases} \sin(x-40) & 0 \leq x-40 \leq \pi \\ 0 & \text{otherwise} \end{cases}. \quad \text{The actual temperature of the tank is measured every hour.}$$

The results are recorded on the number line below: each dot is a measured temperature. **They cluster most densely around temperature A .**



5

What is A ? As usual, justify your answer to demonstrate your understanding of the material.

3. Double or Nothing (**optional**)

Pick one of the two questions on this quiz, and write its number in the box. Full marks (5 points) will be doubled; partial credit (<5 points) will be deleted. The purpose of this question is to encourage you to develop self-reliance in evaluating your understanding.