

Due: Start of Class 19 January 2018

NAME: \_\_\_\_\_

**Problem 1.** Simplify  $\frac{15}{6} + \frac{31}{14}$ . Show as much work as possible.

$$\begin{aligned}
 \frac{15}{6} + \frac{31}{14} &= \frac{\cancel{3} \cdot 5}{\cancel{3} \cdot 2} + \frac{31}{2 \cdot 7} \\
 &= \frac{5 \cdot 7}{2 \cdot 7} + \frac{31}{2 \cdot 7} \\
 &= \frac{35 + 31}{2 \cdot 7} \\
 &= \frac{66}{2 \cdot 7} \\
 &= \frac{33 \cdot \cancel{2}}{\cancel{2} \cdot 7} \\
 &= \frac{33}{7}
 \end{aligned}$$

**Problem 2.** Simplify  $\frac{28}{6} \times \frac{30}{21}$ . Show as much work as possible.

$$\begin{aligned}
 \frac{28}{6} \times \frac{30}{21} &= \frac{\overset{14}{\cancel{28}}}{\underset{\cancel{2}}{3}} \times \frac{30}{21} \\
 &= \frac{14}{3} \times \frac{\overset{10}{\cancel{30}}}{\underset{\overset{7}{\cancel{21}}}{7}} \\
 &= \frac{\overset{2}{\cancel{14}} \cdot 10}{3 \cdot \underset{\cancel{7}}{7}} \\
 &= \frac{20}{3}
 \end{aligned}$$

**Problem 3.** Given  $n! = (n)(n-1)(n-2)\cdots(2)(1)$ . Simplify  $\frac{50!}{46!4!}$ . Show as much work as possible.

$$\begin{aligned}
 \frac{50!}{46!4!} &= \frac{50 \cdot 49 \cdot 48 \cdot 47 \cdot 46 \cdot 45 \cdot 44 \cdots}{(46 \cdot 45 \cdot 44 \cdots)(4 \cdot 3 \cdot 2 \cdot 1)} \\
 &= \frac{50 \cdot 49 \cdot 48 \cdot 47 \cdot \cancel{46 \cdot 45 \cdot 44 \cdots}}{(\cancel{46 \cdot 45 \cdot 44 \cdots})(4 \cdot 3 \cdot 2 \cdot 1)} \\
 &= \frac{50 \cdot 49 \cdot \overset{2}{\cancel{48}} \cdot 47}{\cancel{4 \cdot 3 \cdot 2 \cdot 1}} \\
 &= 100 \cdot 49 \cdot 47 \\
 &= 230,300
 \end{aligned}$$

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**Problem 4.** Find the derivative of  $f(x) = \frac{1}{5x^2}$ .

$$\begin{aligned}
 f'(x) &= \frac{d}{dx} \left( \frac{1}{5x^2} \right) \\
 &= \frac{1}{5} \frac{d}{dx} \left( \frac{1}{x^2} \right) \\
 &= \frac{1}{5} \frac{-2}{x^3} \\
 &= \frac{-2}{5x^3}
 \end{aligned}$$

**Problem 5.** Find  $c$  such that  $\int_0^1 c(x - 3x^2)^2 dx = 1$ .

$$\begin{aligned}
 1 &= \int_0^1 c(x - 3x^2)^2 dx \\
 &= c \int_0^1 x^2 - 6x^3 + 9x^4 dx \\
 &= c \left( \frac{x^3}{3} - \frac{3x^4}{2} + \frac{9x^5}{5} \right) \Big|_0^1 \\
 &= c \left( \frac{1}{3} - \frac{3}{2} + \frac{9}{5} \right) \\
 &= c \left( \frac{10 - 45 + 54}{30} \right) \\
 &= c \frac{19}{30} \\
 c &= \frac{30}{19}
 \end{aligned}$$

For problems 6-9 circle your answer:

**Problem 6.** The voting district of your classmates is what type of data?

Qualitative    Continuous Quantitative    Discrete Quantitative    Ordinal

**Problem 7.** A study involving caffeine consumption among undergraduate students at Clemson University recorded data of students daily caffeine consumption. What type of study is this?Before and After Study    Experimental Study    **Observational Study**    Retrospective Study**Problem 8.** A statistician performs an observational study on the height of herons in relation to nesting altitude. He comes to the conclusion that herons nesting at higher altitudes causes taller herons. Given the nature of the study, is this a reasonable result?Yes    No, the relation is backwards    **No, it is an observational study**    What is a heron?**Problem 9.** Interviews of 100 adults 18 years or older, conducted nationwide, found 44% could state the minimum age required for the office of the U.S. president. The quantity 44% is a parameter. Is this true or false?Yes    **No, it is a sample statistic**    No, it is a property    Wait, there is an age limit?

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**Problem 10.** A professor recorded grades for 20 students who took an exam but when she went to post individual student grades in her book, discovered that the dog had eaten one of the exams, so she did not know the score for that missing test, and was kind enough not to give the student a zero. If the average of the 20 students was 89, and the average of the 19 exams (not eaten by the dog) was 90, what was the missing grade? (Please show your work!)

To solve this problem we use the definition of the mean twice:  $\frac{1}{19} \sum_{i=1}^{19} x_i = 90$  and  $\frac{1}{20} \sum_{i=1}^{20} x_i = 89$ . Thus,  $\sum_{i=1}^{19} x_i = 19 \cdot 90 = 1710$  and  $1710 + x_{20} = 1780$ . Thus,  $x_{20} = 1780 - 1710 = 70$ .