

PRACTICE TEST #2

FREE RESPONSE QUESTIONS #4-6

Complete each FRQ on a separate sheet of paper.
Please allow yourself 15 minutes for each FRQ and treat these like a test. Do not look through your notes or work together.

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PRACTICE TEST 2-4 (CALC ALLOWED)

Let f be a function with $f(1) = 4$ such that for all points (x, y) on the graph of f the slope is given by $\frac{3x^2 + 1}{2y}$.

- Find the slope of the graph of f at the point where $x = 1$.
- Write an equation for the line tangent to the graph of f at $x = 1$ and use it to approximate $f(1.2)$.
- Find $f(x)$ by solving the separable differential equation $\frac{dy}{dx} = \frac{3x^2 + 1}{2y}$ with the initial condition $f(1) = 4$.
- Use your solution from part (c) to find $f(1.2)$.

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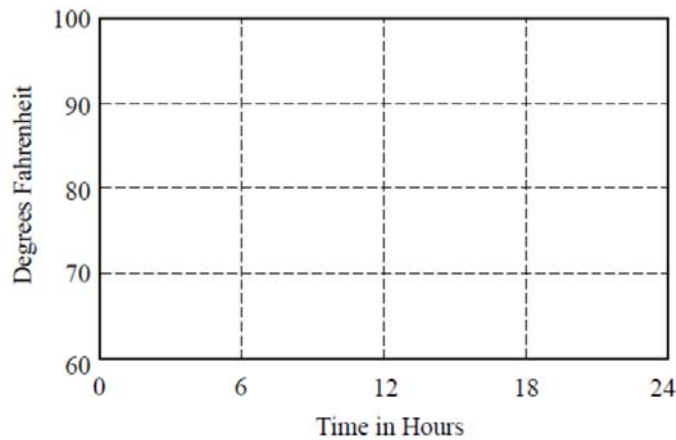
PRACTICESTEST 2-5 (CALC ALLOWED)

The temperature outside a house during a 24-hour period is given by

$$F(t) = 80 - 10 \cos\left(\frac{\pi t}{12}\right), \quad 0 \leq t \leq 24,$$

where $F(t)$ is measured in degrees Fahrenheit and t is measured in hours.

- (a) Sketch the graph of F on the grid below.



- (b) Find the average temperature, to the nearest degree Fahrenheit, between $t = 6$ and $t = 14$.
- (c) An air conditioner cooled the house whenever the outside temperature was at or above 78 degrees Fahrenheit. For what values of t was the air conditioner cooling the house?
- (d) The cost of cooling the house accumulates at the rate of \$0.05 per hour for each degree the outside temperature exceeds 78 degrees Fahrenheit. What was the total cost, to the nearest cent, to cool the house for this 24-hour period?

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PRACTICESTEST 2-6 (CALC ALLOWED)

Consider the curve defined by $2y^3 + 6x^2y - 12x^2 + 6y = 1$.

- (a) Show that $\frac{dy}{dx} = \frac{4x - 2xy}{x^2 + y^2 + 1}$.
- (b) Write an equation of each horizontal tangent line to the curve.
- (c) The line through the origin with slope -1 is tangent to the curve at point P . Find the x - and y -coordinates of point P .

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