EXAM 1 # TQS 211 Practice

Note: This is a practice midterm (that may be a page shorter than it ought to be) and is intended only for study purposes. The actual exam will contain different questions and perhaps a different layout.

1. [] TRUE/FALSE: Circle T in each of the following cases if the statement is *always* true. Otherwise, circle F.

   T F $\frac{d}{dx}b^c = cb^{c-1}$ for a fixed b and c

   T F $(x+y)^2 = x^2 + y^2$

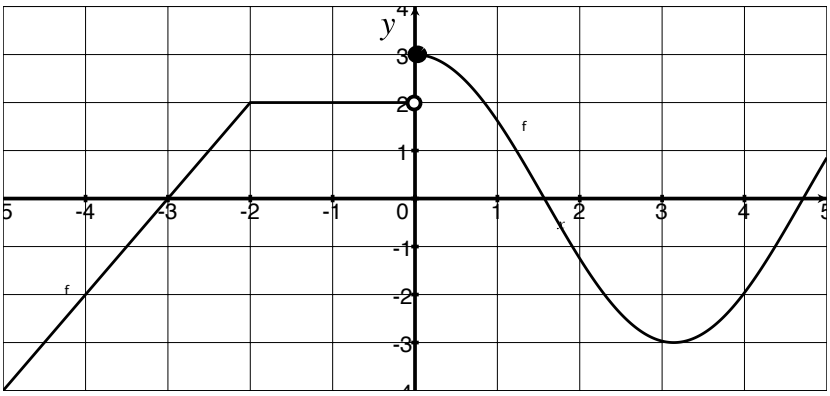
   T F $\frac{d}{dx}2^x = x2^{x-1}$

   T F No profit is made when $MR < MC$

   Show your work for the following problems. The correct answer with no supporting work will receive NO credit (this includes multiple choice questions).

2. Find the rule of a function whose second derivative is negative everywhere and whose graph passes through the point $(2, 0)$.

3. Let f be the function whose graph is below.

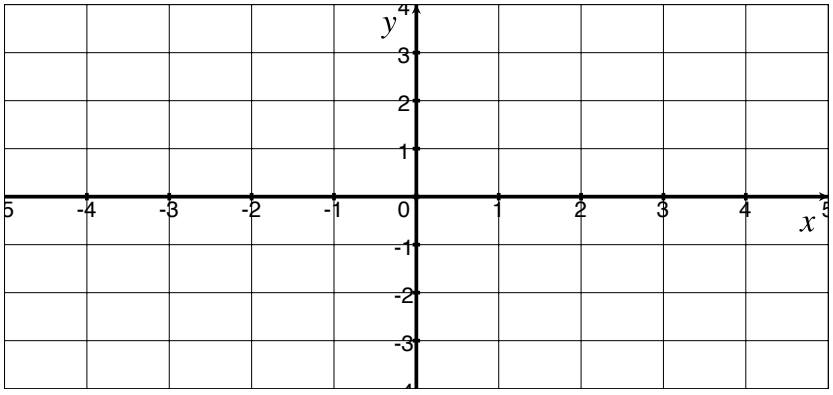


(a) Find the following (if they exist):

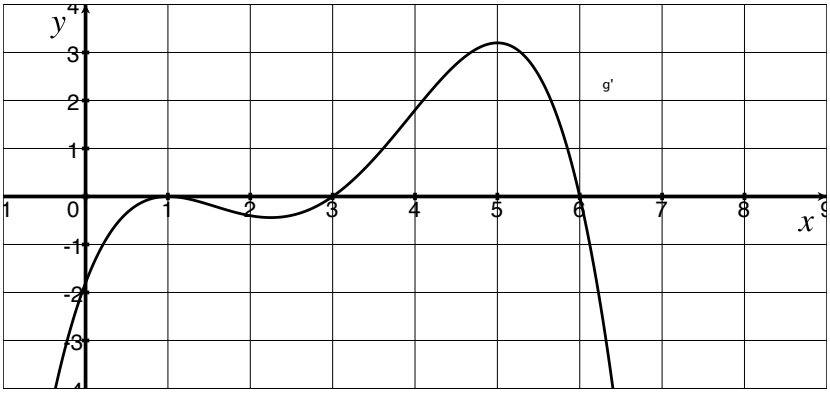
$f(-4)$ $f'(-3)$

$(f \circ f)(-4)$ $(f \cdot f)'(-2.5)$

(b) *Sketch* the graph of f'.



4. Assume you have a business making widgets. Your have tracked your profits and found that the forth degree polynomial below approximates your marginal profit quite well. Let g be the function describing your profit when you produce x widgets and g' be the function with the graph below where x is measured in hundreds of widgets and y is measure in in hundreds of dollars.



(a) Approximate $g'(3)$. What are the units associated with $g'(3)$? What does this mean in terms of widgets and profit?

(b) If you make \$1024 of profit when you make 400 widgets, find an approximation of your profit if you make 500 widgets.

(c) How many widgets should be made to maximize profit? Explain how you know this.

5. [] For each rule of f given below, find $f'(x)$.

$f(x) = \sin(x) + \dfrac{3}{x}$ $\qquad$ $f(x) = 2x^2 + \ln(7x^2)$

$f(x) = \dfrac{3^x \cos(x)}{\cos(\frac{1}{x})}$ $\qquad$ $f(x) = (\sqrt{3x^4 - x})(e^x - 4)$

6. Given $f(x) = e^{3x-6} + x^2 - 4x + 6$ find an equation for the tangent line at $x = 0$.