Exam 2

TMath 124

MW Winter 2016

Name:

1. [4] TRUE/FALSE: Circle T in each of the following cases if the statement is *always* true. Otherwise, circle F. Let f be a function.

   T F $\frac{d}{dt}x^3 = 3y^2\frac{dx}{dt}$

   T F $\lim_{x\to 0} x^2 = 2x$

   T F $(3^x)' = x \cdot 3^{x-1}$

   T F $x^3 = 3x^2$

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

2. [2] Explain what $f'(2)$ is as you would to a third grader.

3. [4] Find $\frac{dy}{dx}$ of the following:

(WebHW9 #5)

$y = 5e^x \cos(x)$

(§3.4 #26)

$$y = \frac{(x+3)^4}{(x^2+3x)^5}$$

4. [5] Find $\frac{dy}{dx}$ of the following:

(WebHW9 #8)

$y = 6^{15x}$

(TrigWks #1)

$y = \sin(x)\sqrt{x^3 - 5}$

5. [4] Find the limit if it exists, or explain why it does not exist.

(TrigWks #2)

$$\lim_{x \to 0} \frac{\sin(2x)}{6x}$$

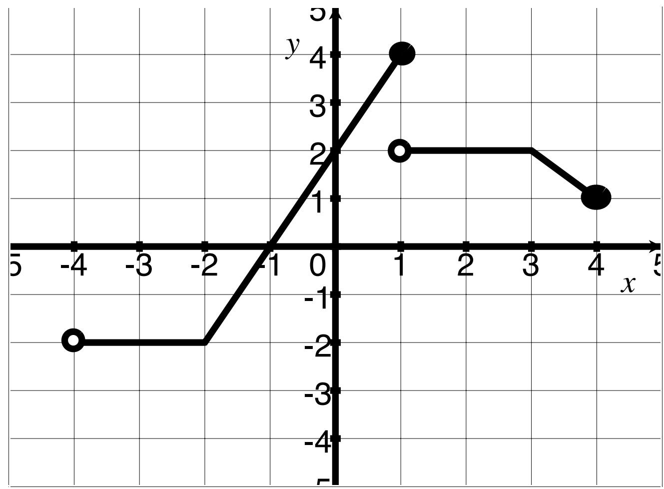
(WebHW4 #4)

$$\lim_{x \to 0} \frac{x}{\cos(x)}$$

6. [4] (Quiz3 #3) Find the linearization of $f(x) = \frac{1}{\sqrt{x}}$ that is parallel to the line $y - 3 = \frac{-27}{2}(x + 5)$

7. [3] (WebHW10 #5) The radius of a sphere is increasing at a rate of 4mm/s. How fast is the volume increasing when the radius is 30mm?

8. Let f be a function where $f(0) = 3$, $f'(2) = 5$, $f'(0) = -1$ and g be a piece-wise defined function graphed below.



(a) [1] $g(1)$

(b) [2] (ProductWks #1)
$(f \cdot g)'(0)$

(c) [3] (§3.2 #44)
$\dfrac{d}{dx}\left(\dfrac{f(x)}{1 + g(x)}\right)\Big|_{x=0}$

(d) [3] (§3.4 #65)
$\frac{d}{dx} f(g(x))|_{x=0}$

9. [5] Choose *ONE* of the following. Clearly identify which of the two you are answering and what work you want to be considered for credit.
   No, doing both questions will not earn you extra credit.

   (a) Consider a ladder 25ft long leaning against a vertical wall. If the bottom of the ladder slides away front the wall at a rate of 1.25ft/s, answer the following questions.

      i. [3] Find a formula for how fast the angle between the ladder and the ground is changing t seconds after the bottom of the ladder begins sliding.

      ii. [2] How fast is the angle between the ladder and the ground changing when the bottom of the ladder is 72inches from the wall?

   (b) Ryan and Stella were being chased by a pack of zombies. At point P they decided to split up. Ryan ran east at about 14 ft/s. Stella waited for 10 seconds to try to draw the zombies towards her and then started to run south at 16ft/s.

      i. [3] Find a formula for how fast the distance between them is increasing as a function of t seconds after Stella started running.

      ii. [2] How fast is the distance between them increasing one minute after Stella started running?