University of Lethbridge
Department of Mathematics and Computer Science
31 October, 2017
MATH 1560 - Test #4 – Group Stage
Examiner: Sean Fitzpatrick

Record the names of your group members below. Groups must contain between 3 and 5 members.

Please print clearly.

1. Last Name:_____ First Name:_____

2. Last Name:_____ First Name:_____

3. Last Name:_____ First Name:_____

4. Last Name:_____ First Name:_____

5. Last Name:_____ First Name:_____

Print your name and student number clearly in the space above. You may remove this cover page, and use the back for scrap paper. If you want any work on the back of this page to be graded, you must clearly indicate this on the page containing the corresponding question.

Answer the questions in the space provided. Show all work and necessary justification. Partial credit may be awarded for partially correct work.

No outside aids are permitted, with the exception of a basic calculator.

MATH 1560: Test 4

[5] 1. Find and classify the critical points of

$$f(x) = x^3(1-x)^2.$$

2. A street light is at the top of a 18 foot tall pole. A 6 foot tall circus bear (who has learned to walk upright) walks away from the pole with a speed of 4 ft/sec along a straight path.

[1] (a) Draw a diagram of the situation.

[2] (b) At what rate is the length of her shadow increasing when she is 30 feet from the pole?

[2] (c) How fast is the tip of her shadow moving when she is 30 feet from the pole?

Total Points: 24

3. Let $f(x) = x^4 - 4x^3$.

[2] (a) Determine a sign diagram for $f(x)$. State the domain of f, and list any intercepts or asymptotes.

[3] (b) Determine a sign diagram for $f'(x)$. State the intervals on which f is increasing or decreasing.

[3] (c) Determine a sign diagram for $f''(x)$. State the intervals on which the graph of f is concave up or concave down.

[2] (d) Sketch the graph of f. Be sure to label all intercepts, critical points, and inflection points.

Total Points: 24

4. **Extra group question!**

Consider the function $f(x) = \dfrac{x}{x^2+4}$, for $x \in (-\infty, \infty)$. Even though you are not given a closed interval, this function does have an absolute maximum and absolute minimum.

[4] Find these values, and justify your answer.

Suggestion: You might find it helpful to consider the graph, and/or the behaviour of $f(x)$ as $x \to \pm\infty$. Since there are no endpoints, any global extrema must occur at local extrema.