

1	2	3	4	5	6	Total

Math 101 Exemption Exam

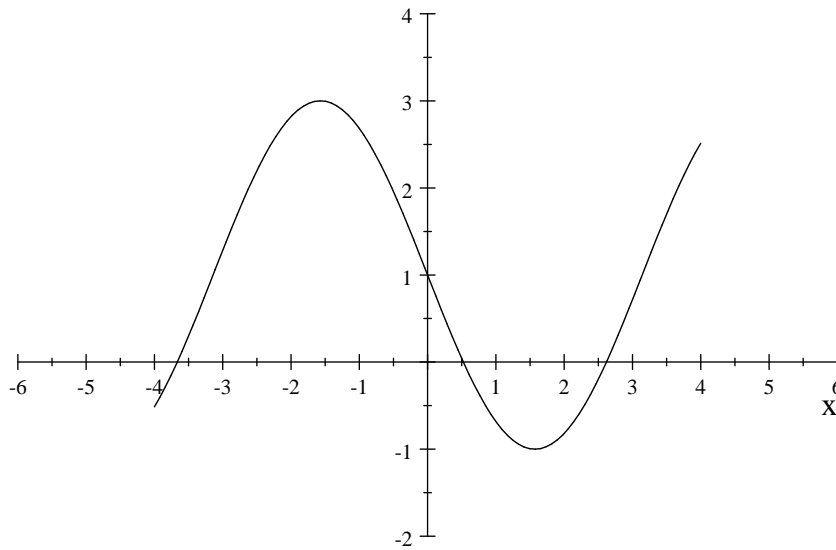
29.09.2010

Duration(90 minutes)

Name:

Student Number:

1. (10 pts) The graph of a function $f(x)$ is given below. Sketch the graph of the function $g(x) = -\frac{1}{2}f(x+2) + 1$.

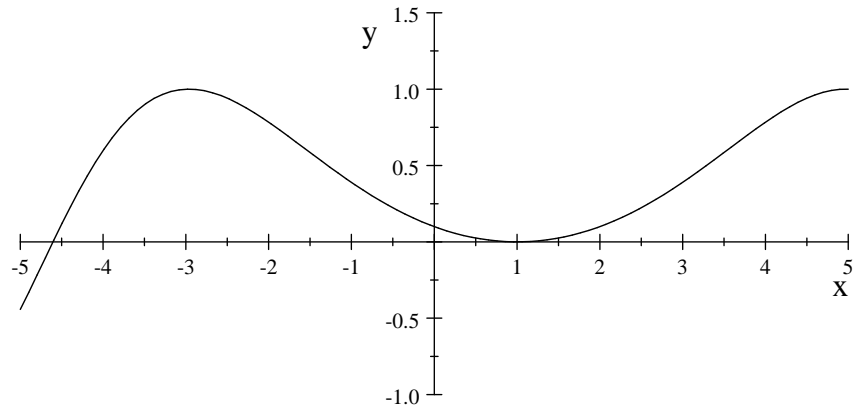


2. (15 pts) Find the points at which the function $f(x) = x^3 - 9x^2 - 48x + 52$ attains its local maximum, local minimum, and global maximum on the interval $(-3, 10)$, if they exist.

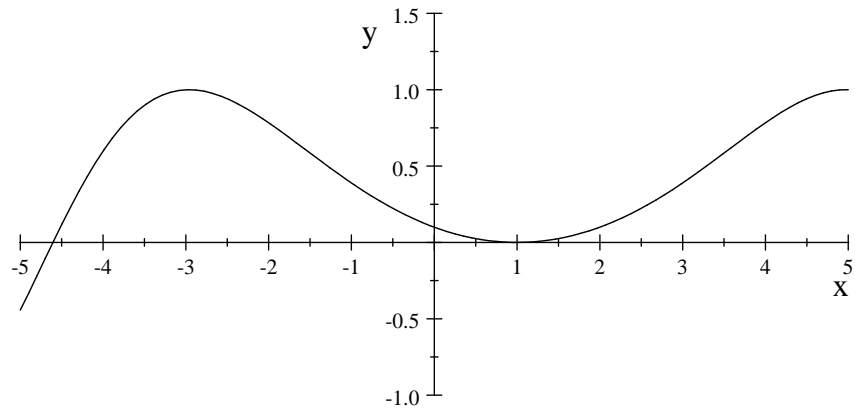
3. (10pt) Of all the cylinders with volume 8cm^3 what are the dimensions of the one which has the **minimum** surface area. (No need to simplify your answer.)

4. (15 pts) The graph of a function $g(x)$ is given below.

(a) Sketch the graph of its antiderivative.



(b) Sketch the graph of g' , the derivative of g .



5. (20 pts) Determine whether the statements below are true or false. Explain your answer. CORRECT ANSWERS WITHOUT ANY JUSTIFICATION WILL NOT GET CREDIT.

(a) The area under the curve $f(x) = \frac{1}{1+x^2}$ and above the x-axis is infinite.

(b) The graph of the function $f(x) = x^4 - x^3$ changes from being concave up to concave down at $x = 0$.

(c) The function $f(x) = \begin{cases} x \sin(\frac{1}{x}) & \text{if } x \neq 0 \\ 0 & \text{if } x = 0 \end{cases}$ is continuous at $x = 0$.

(d) Let f be a differentiable function such that $f(1) = 1$ and $f'(1) = 2$. Then the best linear approximation to f at $x = 1$ is $g(x) = 1 + 2x$.

6. (30 pts) Evaluate the following:

(a) $\lim_{x \rightarrow \infty} \frac{e^x + x^2}{2e^x + x}$

(b) $\lim_{x \rightarrow 0} \frac{\cos(x) - 1}{x^2}$

(c) $\frac{d}{dx} (\sin(\cos(x)))$

(d) $\int x \sin(x) dx$

(e) $\int \frac{e^t + 1}{e^t + t} dt$

(f) $\frac{d}{dx} \int_0^{x^2} \tan(y) dy$